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April 6, 2016

Greg Weigel, On-Scene Coordinator
United States Environmental Protection Agency
950 West Bannock Street, Suite 900, Boise, Idaho 83702

Re: Final Trip Report for the Boise Radiation Apartment Response and Combined Treasure Valley Removal Assessments and Action
Contract Number EP-S7-13-07-E&E, Technical Direction Documents Numbers 14-10-0005, 14-11-0003, and 14-12-0002

Dear Mr. Weigel:

Enclosed please find the Final Trip Report for the Boise Radiation Apartment and combined Treasure Valley Removal Assessments and Action located in Boise and Caldwell, Idaho. If you have any question regarding this submittal, please call me at (206) 624-9537.

Sincerely,

ECOLOGY AND ENVIRONMENT, INC.

Brad Martin

Brad Martin
START-IV Emergency Response Team Leader

cc: Michael Boykin, Task Monitor, EPA, Seattle, WA
Angelica Zavala, Task Monitor, EPA, Seattle, WA

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FINAL TRIP REPORT

Boise Radiation Apartment Response and Combined Treasure Valley Removal Assessments and Action
Boise and Caldwell, Idaho
TDDs: 14-10-0005, 14-11-0003, and 14-12-0002

Prepared for

U.S. Environmental Protection Agency, Region 10
950 West Bannock Street, Suite 900
Boise, Idaho 83702

Prepared by

Ecology and Environment, Inc.
720 Third Avenue, Suite 1700
Seattle, Washington 98104

April 2016

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Executive Summary

The United States Environmental Protection Agency (EPA) responded to the Boise Radiation Apartment site in Boise, Idaho, on October 10th, 2014, after receiving notification by the Nuclear Regulatory Commission (NRC) and Idaho Department of Environmental Quality (IDEQ) of chemical and radiological hazards at a third-floor apartment unit of a multi-family residential complex in Boise, Ada County, Idaho. The unit was found to contain hazardous substances, including corrosives and oxidizers, as well as naturally occurring radioactive material (NORM) and technologically enhanced naturally occurring radioactive material (TENORM), some of which was released in and around the apartment or stored in inappropriate containers. A resident at the unit, identified as the male tenant admitted to chemically and physically processing NORM obtained through various sources. EPA mobilized the Superfund Technical Assessment and Response Team (START) and the Emergency Response and Remedial Services (ERRS) contractors and also requested assistance from EPA Radiation Emergency Response Team (RERT) and the Department of Energy (DOE) Radiation Assistance Program (RAP) Team, Region Six.

Substances discovered on site were found in improper and/or unlabeled containers; were in generally poor condition, including leaking or unsealed; and were not secured, shielded, or stored in otherwise proper conditions. In addition to the apartment unit, two detached garages at street level were screened for radioactive contamination, as were two vehicles and two storage units which were later discovered. Surveys of both vehicles and the storage units identified radioactive contamination or contaminated items.

As part of the operations at the Boise Radiation Apartment site, eight surface soil samples were collected around the site to determine if any surface contamination was present from radioactive material released to the environment. Results indicated that chemical or activity concentrations in samples were indistinguishable from a comparable background. Additionally, 10 bulk solid and liquid samples of TENORM discovered in the unit were collected. Results indicated elevated concentrations of uranium isotopes, as well as significant levels of most radium isotopes in all the samples; generally, the results were representative of TENORM.

Egress pathways from the apartment unit, including sidewalks, stairs, and landings, were screened to determine the presence of radioactive contamination using handheld instrumentation capable of detecting alpha and beta/gamma radiation. The instrument readings were compared to an initial site action level of twice background. Results from the screening procedure identified contamination outside the unit at 71 locations on sidewalks and stairwells. The surfaces were decontaminated by scabbling the surface layer of concrete. Upon removal of the contaminated concrete, the holes were patched with a concrete sealant to level surface.

After removal of the external contamination, the responders entered the unit to assess the hazards in the apartment. The assessment identified the presence of hazardous substances, NORM/TENORM, and contaminated items. As a result, removal activities were initiated to remove the contaminants and place them in a secure area to perform hazard categorization testing. After removing the hazards, the team screened personal property and building materials for radioactive contamination. A site action level was established for wipe samples used to confirm contamination. Decontamination was performed where practical by wiping the affected surface with static fabric sheets or a cloth moistened with a biodegradable cleaner. If contamination remained, the items were inventoried and stored for later disposal. Building materials screened as part of this process included walls, carpets, drain traps, and air vents; based on the results of these surveys, contamination was positively identified on carpeting and in drain traps. These items were removed, inventoried, and stored for later disposal.

During the investigation, information was obtained that the male tenant had access to two storage sheds one of which had been previously screened for contamination by RAP Team 6 early in the response. The initial screening indicated no radioactive sources or contamination at the storage unit at that time. Additional information regarding a second unit was also obtained as response actions at the apartment complex were concluding, so EPA transitioned operations to the units to assess them. The first unit, which had previously been cleared of any radioactive material, was found to contain one piece of highly radioactive material during a second screening. Radioactive source material and localized contamination was identified at the second unit as well. EPA removed the radioactive materials from the storage units and screened them for any residual radioactive contamination. No further contamination was found at this location. On October 31, 2014, site operations concluded with demobilization of all field personnel.

In total, 20 chemical overpacks and 140 items segregated as radiological or mixed waste, including sealed sources, contaminated personal property, contaminated building materials, and investigation-derived wastes (IDW), were processed for disposal. All of the chemicals on site were segregated into overpacks that were assigned an appropriate United States Department of Transportation hazard class and transported to the Burlington Environmental Commercial Storage, Treatment, and Recycling facility in Kent, Washington. All radiological materials and contaminated items were transported to the US Ecology Idaho, Inc. Hazardous Waste Treatment and Disposal facility in Grand View, Idaho, for temporary storage until radioactivity concentrations could be determined. The bulk of wastes, including IDW and items contaminated at activity concentrations below specific NRC licensure criteria for the facility, were disposed of at this location. Items determined to exceed the licensing criteria, including liquid mixed wastes, NORM such as rocks and minerals, contaminated plumbing materials, and industrial source material such as tritium wastes were transferred to US Ecology Richland for final disposal.

After conclusion of activities at the apartment site, information was obtained by the NRC identifying a nearby metal shop that had unknowingly processed radioactive metal samples for the male tenant. Due to concern for residual contamination at the facility, EPA mobilized to the Boise Metal Works in Boise, Idaho, on December 8, 2014, as part of the Treasure Valley Radiation Removal Assessment Operation, to assess and characterize the presence of any radioactive contamination. The survey techniques and action levels utilized at the Boise Radiation Apartment were repeated at this facility. The results of the surveys showed no contamination in common areas; however, contamination was identified in specific work areas where the radioactive material had been processed (cutting and grinding). Contamination exceeding the site action levels was found inside a metal grinding unit, as well as in the dust collection bag attached to the unit. Samples were collected from the waste bag; sediment samples were also collected from a water jet cutter's grit catch due to its use in cutting the radioactive metal. The samples were submitted for analysis to a subcontract laboratory, and results from these samples confirmed the presence of uranium and certain uranium isotopes. The grinding unit was decontaminated, with the resulting IDW and bulk material being packaged for transport to the US Ecology Idaho, Inc. facility in Grand View, Idaho, to await a final waste determination. EPA demobilized with all response assets from the metal shop on December 11, 2014.

After demobilization from the Boise Metal Works site, information was obtained that the male tenant was suspected of performing similar activities involving radioactive materials at a former residence in Caldwell, ID. Therefore, EPA mobilized to one of the former residences in Caldwell, Idaho, on January 21, 2015, as part of the Treasure Valley Rad Removal Assessment Operation to perform a clearance survey of the inhabited apartment. Results from the screening showed no residual contamination above site action levels. All field activities associated with the Boise Radiation Apartment and combined Treasure Valley Removal Assessments were concluded upon demobilization from the Caldwell apartment.

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LIST OF ACRONYMS AND ABBREVIATIONS

Term	Definition
%R	percent recovery
Am-241	americium-241
ASTM	American Society for Testing and Materials
BS	blank spike
CIC	Community Involvement Coordinator
cpm	counts per minute
DOE	United States Department of Energy
dpm/100cm^2	disintegrations per minute per 100 square centimeters
DQO	data quality objective
DU	depleted uranium
EPA	United States Environmental Protection Agency
ERRS	Emergency Response and Remedial Services
G-M	Geiger-Mueller
HP	Health Physicist
IDEQ	Idaho Department of Environmental Quality
MCP	Mobile Command Post
MS/MSD	matrix spike/matrix spike duplicate
NORM	naturally occurring radioactive material
NRC	Nuclear Regulatory Commission
OSC	On-scene Coordinator
QA	quality assurance
QC	quality control
Ra-226	radium-226
Ra-228	radium-228
RAP	Radiological Assistance Program
RP	Responsible Party
RPD	relative percent difference
RRT	Regional Hazardous Materials Response Team
RTFL	Radiation Task Force Leader
START	Superfund Technical Assessment and Response Team
TENORM	technologically enhanced naturally occurring radioactive material
Th-232	thorium-232
TLD	thermoluminescent dosimeter,
U-234	uranium-234
U-235	uranium-235
U-238	uranium-238
ZnS	zinc sulfide

1. Places Visited

Site Name: Boise Radiation Apartment Response
Owner Name: Weststar Property Management
Location: 6342 North Park Meadow Way, # 304
Boise, Ada County, Idaho, 83713
SSID: 10NL
CERCLIS ID: IDN001001341
Latitude: 43.662672 **Longitude:** -116.344773
Dates of Response: October 10–31, 2014

Site Name: Treasure Valley Removal Assessment/Action - Boise Metal Works
Owner Name: Burke Borup
Location: 11420 Executive Drive
Boise, Ada County, Idaho, 83713
SSID: 10NP
CERCLIS ID: Not Applicable
Latitude: 43.609697 **Longitude:** -116.325078
Dates of Response: December 8 – 10, 2014

Site Name: Treasure Valley Removal Assessment - Eldorado Apartments
Owner Name: Park Place Property Management
Location: 3905 Idaho Avenue, #103
Caldwell, Canyon County, Idaho, 83605
SSID: 10NP
CERCLIS ID: Not Applicable
Latitude: 43.635148 **Longitude:** -116.685849
Dates of Response: January 21, 2015

2. Purpose

The United States Environmental Protection Agency (EPA) tasked the Superfund Technical Assessment and Response Team (START) and the Emergency Response and Remedial Services (ERRS) contractor to conduct an emergency assessment and removal of hazardous substances, radioactive and radioactively contaminated materials, and their containers at the Boise Radiation Apartment Response site and the Treasure Valley Radiation Assessment/Action sites; perform sampling and hazard categorization analysis of unknown substances; perform surface soil sampling to determine if any releases of hazardous substances had historically occurred; and record site conditions and activities using logbook entries, photographic documentation (Attachment A), and analytical instrumentation or electronic tablets.

3. Persons Involved

Agency/Company	Contact Persons/ Position
United States Environmental Protection Agency	Greg Weigel – Federal On-Scene Coordinator

Agency/Company	Contact Persons/ Position
	Mike Boykin – Federal On-Scene Coordinator
	Angelica Zavala – Federal On-Scene Coordinator
	Christopher Royce – Health Physicist
	Rod Lobos – Radiation Task Force Leader
	Chris Guzzetti – Radiation Task Force Leader
	Wendy Adams – Critical Incident Stress Manager
	Kay Morrison – Community Involvement Coordinator
	Mark MacIntyre – Public Information Officer
	Cliff Villa – Attorney
United States Nuclear Regulatory Agency	Janine Katanic – Health Physicist
United States Department of Energy – Radiological Assistance Program Team Region 6	Assorted Field Team Members
Idaho Department of Environmental Quality	Mark Dietrich – Technical Services Administrator
START (Ecology and Environment, Inc.)	Chris Whitehead – Project Manager
	Eric Nuchims – START Safety Officer/Responder
	David Burford – Data Manager/Responder
	Alan Jensen – Responder
	Brad Martin – Responder
	Jake Moersen – Responder
	Jonathan Reeve – Responder
	Mark Woodke – Responder
	Mike Worden – Responder

Agency/Company	Contact Persons/ Position
	Mark Zawistowski – Responder
ERRS (Environmental Quality Management, Inc.)	Bryan Chernick – Project Manager
ERRS Subcontractor	H2O Environmental
US Ecology Idaho, Inc.	Jim Hancock – Quality Assurance Manager

4. Background

On October 8, 2014, the Idaho Department of Environmental Quality (IDEQ), the Boise Regional Hazardous Materials Response Team (RRT), along with representatives of the United States Nuclear Regulatory Commission (NRC), responded to an apartment complex based on a report of radioactive materials originating from 6342 North Park Meadow Way Apartment 304, Boise, Ada County, Idaho (see Figure 1-A for a site location map and Figure 2-A for the site map). The unit is a third-floor apartment in Building 5 of a multi-family residential complex called Renaissance Apartments at Hobble Creek. The complex sits between a residential neighborhood to the north and west, a commercial business park to the east, and the Cecil D. Andrus Elementary School to the south.

Upon entering the apartment, initial responders noted various naturally occurring radioactive material (NORM) and sealed sources throughout the living room and bedrooms. Among these items, responders observed suspected technologically enhanced naturally occurring radioactive material (TENORM) spilled on surfaces and personal items throughout the apartment. Responders observed evidence of active TENORM processing in the bathrooms, along with associated hazardous materials and constituents used for chemically processing radioactive materials, such as muriatic acid and hydrogen peroxide. The NRC interviewed the residents at the unit to determine what activities associated with processing of radioactive materials had occurred at the property. One resident, (b)(6), hereafter referred to as the male tenant and a responsible party (RP) to the incident, claimed he was actively involved with converting the NORM material into TENORM using various processes he was developing. In addition to items in the apartment, photographic evidence was obtained of depleted uranium (DU) stored in a vehicle owned by the male tenant. IDEQ and NRC notified the EPA of the potential unsafe conditions associated with the chemical and radiological hazards at the site.

OSC Greg Weigel mobilized START and ERRS to perform an emergency assessment of the hazards at the site. Additionally, OSC Weigel contacted the United States Department of Energy's (DOE) Radiological Assistance Program (RAP) Region 6 to request their support in characterizing radiological hazards. All teams arrived on site October 10, 2014, to perform initial entry to the unit and begin an emergency removal assessment of the interior.

During the response, the male tenant and the other resident of the unit, (b)(6), hereafter referred to as the female tenant and a potential RP, consented to EPA access of the unit, all property within, and certain other property under ownership of the site tenants such as, but not limited to vehicles. The tenants agreed to vacate the unit until activities at the property were completed, with EPA providing temporary lodging and per diem meals.

Section 5 provides a detailed account of all activities associated with the Boise Radiation Apartment Response and Treasure Valley Removal Assessments and Removal Action. This report combines these separate projects into one report due to the relation of these projects. Identification of the various sites did not occur in some cases until after specific information pertaining to scope and purpose of a given removal activity was established; however due to historical activity of the male tenant being the origin of all of the projects, this report synthesizes the various activity into one event.

5. Activities

5.1 Initial Response – October 10 to 11, 2014

On October 10, 2014, EPA OSC Weigel, one START member, and one ERRS contractor, two NRC personnel, and the DOE Region 6 RAP team mobilized to the Boise Radiation Apartment site to conduct an emergency assessment of potential radioactive and chemical hazards. The first action undertaken on site was to coordinate with the tenants to obtain consent for access to the apartment and all associated garage units by acquiring keys and remote entry devices. Subsequently, EPA screened the tenants for radioactive contamination. One cat also resided in the unit; however, the animal had already been removed prior to arrival of EPA and was not screened as part of the access agreement.

Additionally, access to the male tenant's personal vehicle was negotiated as part of the access agreement. There was some difficulty initially in acquiring the male tenant's consent for access to the vehicle, as he vacillated between granting and rescinding access several times; however, access was eventually recognized as part of the agreement with him.

5.1.1 Removal Assessment Activities

After EPA accessed the site, DOE RAP screened their persons for radiation. Screening at all Boise Radiation Apartment and Treasure Valley sites was performed using hand-held instrumentation equipped with a zinc sulfide (ZnS) probe capable of detecting alpha radiation and a Geiger-Mueller (G-M) probe capable of detecting beta/gamma radiation. These instruments are used in tandem to scan for both fixed radiation, emanating from radioactive material embedded in a given matrix, and removable contamination, which is radioactive material loosely affixed to the surface of a given matrix. This general procedure is hereafter referred to as in-situ screening. The results obtained from in-situ screening were compared to a background reading collected outside of potentially contaminated areas. Initially, the action level for in-situ screening was established as twice the background reading. Background was collected each day prior to beginning the screening procedure and recorded in digital field forms or in logbooks. In general, the background as determined using the handheld instruments did not exceed 14 counts per minute (cpm) on a ZnS probe and 76 cpm on a G-M probe.

In addition to in-situ screening, wipe samples were collected by using an adsorbent material approximately 5 centimeters in diameter to wipe an area of 100 square centimeters. The wipes were then read on fixed instrumentation in a radiological field laboratory that analyzed for alpha and beta radiation using a Ludlum 3030. This procedure is hereafter referred to as swipe sampling (E&E 2014a). The action level for swipe sampling was established as 50% of the values listed in Table 1 of NRC Regulatory Guide 1.86, Termination of Operators Licenses for Reactors (NRC 1974). The specific values taken from Table 1 include the removable limit for

beta/gamma emitters of 1,000 disintegrations per minute per 100 square centimeters (dpm/100cm^2) and the removable limit for transuranics and certain other NORM (excluding uranium isotopes and their decay chain products), which was the value used for alpha-emitters of 20 dpm/100cm^2. Since the action limits were taken as 50% of these values, the site action level was established as 10 dpm/100 cm^2 for alpha radiation and 500 dpm/100cm^2 for beta/gamma radiation. Note that these levels were chosen because they were the most conservative values for removable surface contamination and not because they represented the specific isotopes expected on site.

The DOE RAP assessed the tenants for contamination by performing in-situ screening of their clothes and exposed skin from head to toe, front and back. Nasal swab samples were also screened by swabbing the interior of the nasal passage and screening the swabs to determine if any removable contamination was present in the nasal passage which is an indicator of internal contamination by inhalation of airborne radioactive material. Results of these tests on the female tenant indicated that no radioactive contamination was present on her person. Results of these tests on the male tenant detected radioactive contamination on the toe of his left shoe at approximately 300 cpm on a G-M probe; this value exceeded the initial site action level. Based on these results, EPA retained the male tenant's shoes for disposal as contaminated waste but reimbursed him for a new pair to replace them due to this inconvenience. The tenants departed the apartment complex after exit screening to their EPA-provided temporary housing.

DOE RAP next performed an assessment of the vehicle owned by the male tenant. The second vehicle, owned by the male tenant, was not provided for screening on October 10. The vehicle surveyed was a 2006 Pontiac Solstice. Results of the screening showed no radioactive contamination on the exterior or passenger interior; however, upon screening of the trunk, results showed values peaking at 400 cpm on a ZnS probe and 2,200 cpm on a G-M probe, exceeding site action levels by two orders of magnitude. See Figure 3-C for a map of locations sampled and results of this survey. Based on these results, OSC Weigel notified the male tenant that the vehicle would remain on site until decontamination could be completed.

Once the tenants had departed the site, START and DOE RAP begin preparations for making entry to the apartment unit. First, work zones were established to control the spread of radioactive contamination from the apartment interior. The apartment unit was defined as the exclusion zone for the duration of the response. No one was permitted entry to the exclusion zone unless accompanied by at least one other responder, and entry required at least one other responder to remain outside the unit in constant radio contact in the event of an emergency. The landing area outside the apartment area was designated as the control point and was used to stage equipment and supplies to aid entry operations, as well as act as the decontamination station for responders exiting the exclusion zone. Egress from the control point was possible via two routes: down a flight of stairs on the north side of Building 5 directly in front of the unit to a first floor landing or through a landing on the third floor to a staircase on the south side Building 5. Both of these routes lead to the parking lot along the south of Building 5, which was established as the support zone.

After work zones were established, responders donned Level C protective equipment and made initial entry to the unit to determine the extent of radioactive contamination. The purpose of the entry was to perform initial assessment of the hazardous substances, radioactive materials, and ambient air in the unit, as well as to obtain critical personal property to return to the tenants if it was determined to be free of radioactive contamination. Specific initial assessment activities consisted of in-situ screening, identifying specific radioactive materials using specialized

instrumentation, and determining dose rates. Results of the initial assessment confirmed the presence of americium-241 (Am-241), radium-226 (Ra-226), thorium-232 (Th-232), uranium-235 (U-235) and uranium-238 (U-238), including several pieces of suspected DU. Instruments showed that radiation levels in the apartment exceeded 60,000 cpm on G-M probes when placed near certain sources, such as the suspected DU samples. Dose rates reached a maximum of 1.5 milliroengten per hour within a few inches of certain sources, such as a commercially available ceramic urn, called a revigator that contained radium; the typical background radiation level in the apartment ranged between 300 and 500 microroengten per hour, varying by room. These values exceed typical background dose rate levels by a factor of approximately 30 to 50. Additionally, several personal items were retrieved from the interior for the tenants. The items were screened at the control point using hand-held instrumentation and determined to be free of any external contamination. Swipes were also collected for later analysis in a radiological field laboratory. Results of the swipe samples found no external contamination present on the removed items.

Upon conclusion of the initial entry on October 10 and throughout site operations, all personnel exiting the unit were decontaminated by first removing outer-layer chemical protective suits, then undergoing in-situ screening, starting at the head and surveying all surfaces down to their feet at a rate of one detector face per second. A detailed scan of hands and feet bottoms was also performed; if no indication of contamination was present, responders were free to leave the decontamination station at the control point, leaving all equipment and tools for later decontamination screening.

As site activities were concluding on October, 10, two additional START contractors arrived from Seattle in the Mobile Command Post (MCP) and a 12-foot equipment trailer. This vehicle carried primary EPA Region 10 radiological response assets and served as the operational hub for the site. At that time, EPA, NRC, IDEQ, and all contractor assets demobilized from site with all response assets for the day.

On October 11, EPA, NRC, START, and ERRS arrived on site to initiate site activities. At this time, the MCP was staged on the access road in front of the unit; the access road was secured on both sides using traffic cones and caution tape and was established as the Support Zone for the remainder of site activities. After daily health and safety and operational status meetings were held, responders entered the unit and obtained an air sample to determine the internal dose exposure to responders. During the entry, additional characterization activities were performed to confirm the findings of the initial entry and to begin segregation of chemical hazards in the apartment. Preliminary results of the air samples indicated that airborne contamination in the apartment was not at levels that exceeded derived air concentrations as determined by the DOE RAP Health Physicist (HP). Based on this information, EPA determined that entry to the unit could be permitted in Level D under limited circumstances such as short-duration trips or if the activity would not disturb any radioactive materials or personal items.

Additional removal assessment activities included screening two garages known to have been utilized by the tenants. One of the units, Garage #16, had recently been vacated because the roll-up garage door was damaged and could not be secured; the other unit, Garage # 14, was currently used by the male tenant to store his vehicle. Access to Garage # 14 was limited because it was secured using a wireless garage door opener; the male tenant did not provide the garage door opener before departing the site, so a wireless garage door opener was obtained that could provide access. DOE RAP performed in-situ screening and swipe sampling in both garages to determine if any radioactive contamination was present. Results of the surveys identified no contamination

above site action levels. Additionally, one START member and one DOE RAP team member collected swipe samples of stormwater drains in the vicinity of the apartment building and garages. Results of this swipe testing showed no indication of contamination around the drains.

Once access to the male tenant's vehicle had been granted, the vehicle was decontaminated by cutting out the contaminated carpeting from the trunk and double-bagging it for disposal. Contamination was still encountered beneath the carpeting, so adhesive residue was scraped from the metal frame. All formerly contaminated areas were rescreened and determined to be free of any contamination above the site action level. The vehicle was subsequently released to the male tenant. OSC Weigel notified him that the vehicle was cleared, and within a few hours he arrived on site to retrieve the vehicle.

During the vehicle decontamination process, OSC Weigel received information that relatives of the male tenant owned a storage unit to which he had access. Based on this information, OSC Weigel contacted the relative and requested access to the unit to determine if any radioactive materials were stored in the unit or if radioactive contamination was present from historical storage of radioactive materials. DOE RAP team members accompanied by one START member, and an EPA attorney mobilized to the Stor-It self-storage facility at 600 North Maple Grove Road, Unit B35 to perform in-situ scanning and swipe testing. Advanced instrumentation was deployed by DOE RAP Team 6 including an ORTEC EX100 Detective, which is a field-portable gamma spectroscope capable of isotope identification for enclosed spaces as well as an RSI RS-700 Mobile Radiation System, which is a vehicle-mounted gamma spectroscope capable of analyzing a wide area with high-precision. Results of the survey indicated no radioactive materials or contamination in or around the unit.

A second entry into the apartment was made on October 11 to retrieve additional personal items requested by the tenants. The items were retrieved, screened for contamination, and results of the screen found no external contamination present. The items were provided to the tenants by OSC Weigel. Upon completion of these activities, preparation for daily demobilization began. At this time, an ERRS security subcontractor arrived on site and was shown the location of points of interest and resources that would be staged overnight. Security personnel maintained watch over the site overnight for the duration of the response. This concluded removal assessment activities for October 10 and 11.

5.1.2 Waste Management

After the first two days of initial response activities, the waste generated primarily consisted of investigation-derived waste (IDW) resulting from entries to the unit. This type of waste was collected in waste bags inside the apartment presumed to have become contaminated by radioactive contamination in the apartment. The IDW was staged in the apartment until a proper disposal option could be formulated.

Non-contaminated waste generated in the support zone was segregated into generally accepted recyclable material and solid waste. These wastes were stored in response vehicles or equipment trailers until additional response resources could arrive.

5.1.3 Sampling and Monitoring Activities

Primary sampling activities consisted of sampling ambient air in the apartment unit during initial assessment. Air samples were collected to determine the presence of radiation by displacing large volumes of air through a filter media and analyzing the particulate collected on the filter for the presence of radiation either using hand held instruments or, more typically, in the radiological

field laboratory. Throughout the response, any entry into the apartment unit was made in conjunction with an air sampler in the area of primary work duties, regardless of level of protection deployed by the workers.

During the initial response period, DOE RAP deployed air sampling equipment to determine the exposure to radiological contamination. On October 10, air sampling instrumentation did not properly display flow rate, which is a necessary parameter to determine total volume of the sampler. As a result, the air sampling results for this entry were qualified by DOE and re-collected on October 11.

5.1.4 Community Relations

EPA mobilized Community Involvement Coordinator (CIC) Kay Morrison to the site for the initial response period to engage with residents of the apartment complex and answer questions or concerns of passers-by. CIC Morrison also supported OSC Weigel during community meetings conducted within the complex, which were open to all residents.

5.1.5 Health and Safety

All site health and safety requirements at the Boise Radiation Apartment and Treasure Valley sites were established and maintained under EPA direction, as the responses were conducted under EPA command. As stated in the site-specific health and safety plan, certain specific requirements were enforced as part of operations on site. All personnel working past the Support Zone were required to wear a thermo-luminescent detector badge, at minimum. Additionally, during initial response activities, EPA direct read dosimeters were not available for all staff; however, DOE RAP maintained this capability for all personnel manning the control point or entering the exclusion zone.

Initial entries to the residence were performed using Level C respiratory protection until suitable air sampling data could be analyzed to indicate the levels of airborne contamination in the property. Once air sampling data were returned indicating a low threat of exposure above background, specific short-duration or minimally impactful excursions into the property were permitted in Level D.

Throughout the response, the principle of "as low as reasonably achievable" was utilized to limit the dose to workers from radiation at the site was reduced to the lowest practicable amount. The radiological exposure concepts of time, distance, and shielding were employed to assist with this, which included limiting the amount of time in a zone with radiological materials or contaminated items; moving these materials to a location as far as possible from workers or the public while still being stored on site; and, where possible, placing barriers between the materials and workers or the public.

During the initial health and safety meeting, it was determined that on-site hours would occur between 8:00 a.m. until no later than 7:00 p.m. each day, in hopes of minimizing disruption to residents in the immediate vicinity of the unit being assessed. On-site personnel would convene at 8:00 a.m. to hold the daily safety briefing, which generally consisted of daily progress reports of the prior day's activities, the primary objectives for the upcoming day, and related safety concerns associated with each task related to accomplishing the objective.

5.2 Initial Response – October 12 to 13, 2014

5.2.1 Removal Assessment Activities

On October 12, EPA, IDEQ, START, and ERRS personnel arrived on site to begin planning the transition to removal phase activities. The planning meeting was attended by OSC Weigel, a DOE HP, and START personnel in the MCP, and by EPA RERT Commander Christopher Royce via telephone. Results of the planning meeting identified several actions required for completing assessment phase activities and transitioning to the removal phase, including establishing the initial site action level as twice background (with the understanding that a more conservative value would be established for removal phase operations); collecting soil samples around the apartment unit; and performing an initial swipe sample survey of the apartment interior. DOE personnel stated that the RAP team was planning to demobilize by the end of operations on October 13. Based on this information and information obtained regarding contamination identified outside the unit (discussed below), EPA Commander Royce was requested to mobilize to the site and assist with removal phase operations.

During the planning meeting, DOE personnel began in-situ screening of soils around Building 5. Results from the initial screening indicated no radiation levels above background; however, during the screening, suspect staining was observed on concrete walkways, prompting the DOE RAP to begin screening these areas between the unit and the parking lot, including all sidewalks, stairways, and landings. Results of this screening identified 76 unique locations where instrument readings of radiation levels exceeded the initial site action level of twice background. The total pattern of the 76 locations formed a dripline path from the parking lot area, up the south staircase, and north along the third floor landing to the exclusion zone boundary. The portion of the dripline at the parking lot area was found to pass along a path in front of an apartment where a family with three young children lived and were known to play on the sidewalk, potentially in direct contact with these areas. Based on these findings, ERRS subcontractors mobilized to the site to prepare for decontamination of the concrete walkways; however, decontamination activities were postponed until October 13 to allow time for development of a decontamination plan.

DOE and START personnel also entered the exclusion zone on October 12. The purpose of this entry was to perform further characterization of the isotopes identified during the initial entry, complete an initial swipe survey, collect air samples for aiding in modeling of internal exposure, collect bulk solid and liquid samples for subcontract laboratory analysis; and collect personal items for clearance and return to the tenants. Upon completion of these actions, the entry team exited the unit and passed through the decontamination station, yielding all samples, equipment, and personal items to the control point. The samples were immediately placed under chain of custody in a locked cooler until sample processing could be performed. Results of the initial swipe survey performed during this entry showed several locations where removable contamination was present. See Figure 3-A for a map of locations sampled and results of this survey. Several personal items were removed from the apartment and returned to the tenants after clearing decontamination.

During this assessment, the responders noted an aggregate of apparent solid waste that was stored on a partially enclosed porch accessible only from the apartment interior. This waste was located around loose contamination sampled during the assessment. The waste remained staged on the porch until appropriate screening and disposal plan could be developed. After all items cleared

the decontamination station, responders demobilized for the day with the majority of DOE RAP personnel permanently demobilizing.

On October 13, ERRS presented several options for decontamination of the sidewalk area. Initial attempts to decontaminate these areas consisted of non-destructive techniques such as spraying biodegradable or oxidative cleaners on the stains, scrubbing, and then wiping up with water and cloth towels; however, this option proved unsuccessful since subsequent screening noted contamination above the initial site action level. Next, ERRS acquired a needle scaler powered by an industrial air compressor to scabble the top layer of contaminated concrete. The potentially contaminated dust generated by this process was collected with a shop vacuum positioned directly over the needle scaler. The scabbling technique was successful at reducing contamination to below the site action level at the 76 locations, except at 11 locations that required a second scabbling to reduce levels below the initial site action level.

Access to the garage unit was also made possible by the wireless garage door opener obtained; however, security of this unit could not be guaranteed so the garage door was reprogrammed to minimize the potential for other wireless devices to open the door. Upon completion of these activities, all remaining DOE RAP personnel demobilized from the site. Subsequently, one additional START member arrived from Seattle with the Level A truck, which was staged adjacent to the MCP in the Support Zone.

5.2.2 Waste Management

The majority of IDW continued to be stored in the apartment due to its generation being associated with entries to the apartment; however, an additional stream was generated based on the decontamination of the sidewalk scabbling activities. This waste was securely stored in the Support Zone overnight inside of an equipment trailer. Planning activities identified the Garage # 14 unit as a storage location for hazardous and mixed waste as well as IDW.

5.2.3 Sampling and Monitoring Activities

Air sampling activities were performed daily inside the residence during entries for modeling internal exposure using dosimetric calculations. The air samples were analyzed in the radiological field laboratory immediately upon sample collection and again at least one hour after the initial sample collection. The results were compared to see if any decline in activity was detected. If the sample result was reduced by at least half the initial activity after one hour, the result was attributed to decay chain products of NORM, which present a low threat to internal exposure since this is typically accounted for in background exposure assessment. In general, samples analyzed after the one-hour period returned results consistent with NORM.

On October 13, seven soil samples, including one duplicate and one composite sample, were collected around Building 5, and one background sample was collected around Building 3 approximately 200 feet west of Building 5. The samples were labeled, packaged, and submitted to the ALS Environmental laboratory in Fort Collins, Colorado, for analysis of:

- Total uranium according to EPA SW-846 Method 6020 by Inductively Coupled Plasma and Mass Spectrometry;
- Ra-226 and Ra-228 according to EPA Method 901.1 for gamma-emitting radionuclides; and
- Isotopic Am-241 according to American Society for Testing and Materials (ASTM) D3972 by Alpha Spectroscopy

Results of the analyses showed no significant deviations above background. Table 5-1 summarizes soil sample results.

Table 5-1 Boise Radiation Apartment Soil Sample Results

Sample	Am-241 (pC/g)	Uncertainty (pCi/g)	Ra-226 (pCi/g)	Uncertainty (pCi/g)	Ra-228 (pCi/g)	Uncertainty (pCi/g)	Total Uranium (µg/kg)
14100001	-0.023 U	0.022	1.29	0.34	1.18	0.45	1700
14100002	-0.006 U	0.016	0.84	0.27	0.84 U	0.62	1400
14100003	-0.003 U	0.017	0.69	0.31	0.74 U	0.65	750
14100004	-0.014 U	0.014	1.16	0.35	1.13	0.69	1500
14100005	-0.015 U	0.018	1.17	0.32	1.13	0.45	1800
14100006	-0.003 U	0.018	1.25	0.31	0.8 U	0.45	1600
14100007	-0.025 U	0.02	0.75 U	0.42	0.84 U	0.45	1600
Back-ground	**Am-241**	**Uncertainty**	**Ra-226**	**Uncertainty**	**Ra-228**	**Uncertainty**	**Total Uranium**
14100008	-0.003 U	0.016	1.13	0.43	1.18	0.82	1600

µg/kg = microgram per kilogram
AM-241 = americium-241
pCi/g = picocuries per gram
Ra-226 = radium-226
Ra-228 = radium-228
U = Sample result was not detected above the Minimum Detectable Activity

Additionally, a total of 10 bulk material samples were collected during the entry. The samples consisted of eight solid samples of suspected TENORM found in disposable cups and bowls in both bathrooms, several vials found in a kitchen cabinet, loose material found spilled on the concrete floor of the partially enclosed porch (the remainder of the material not collected was covered with plastic sheeting to mitigate further release), and two liquid samples in glassware found in a bathroom where the majority of chemical processing appeared to be concentrated. The samples were labeled, packaged, and submitted to the ALS Environmental laboratory in Fort Collins, Colorado for analysis of:

- Total uranium according to EPA SW-846 Method 6020 by Inductively Coupled Plasma and Mass Spectrometry;
- Ra-226 according to EPA SW-846 9320 for alpha-emitting nuclides by gas flow proportional counting;
- Ra-228 according to EPA Method 903.1 for gamma-emitting radionuclides by the Radio emanation technique; and
- Isotopic uranium-234 (U-234), U-235, and U-238 according to ASTM D3972 by Alpha Spectroscopy.

Results of the analyses showed significant concentrations of uranium ranging from 47% to 99% by weight; elevated radioactivity concentrations of uranium isotopes in all samples; and detections of Ra-228 in all samples. Approximately half of the samples had detections of Ra-226. See Tables 5-2a and 5-2b summarizing the product sampling results.

Table 5-2a Boise Radiation Apartment Bulk Sample Results (Radium and Select Thorium Isotopes)

Sample	Ra-226 (pCi/g)	Uncertainty (pCi/g)	Ra-228 (pCi/g)	Uncertainty (pCi/g)	Th-227 (pCi/g)	Uncertainty (pCi/g)	Th-234 (pCi/g)	Uncertainty (pCi/g)
14100010	110	65	22.2	7.6	-40 U	130	160 U	550
14100011	10 U	22	17.5	4.4	-46 U	63	122000	14000
14100012	-12 U	21	22.2	5.4	7 U	70	97000	11000
14100014	17 U	28	15.7	4	-29 U	91	106000	12000
14100016	19 U	24	15	3.8	34 U	62	104000	12000
14100017	3 U	12	19.5	4.8	-21 U	42	101000	12000
14100021	18 U	25	61	14	-17 U	73	125000	15000
14100024	7 U	30	30.8	7.4	-52 U	85	20100	2400
141001022	0.74 U	0.62	6.8	1.8	0.80 U	2	9700	1100
141001023	-0.02 U	0.21	1.68	0.72	0.17 U	0.48	412	49

pCi/g = picocuries per gram
Ra-226 = radium-226
Ra-228 = radium-228
Th-227 = thorium-227
U = Sample result was not detected above the Minimum Detectable Activity

Table 5-2b Boise Radiation Apartment Bulk Sample Results (Total Uranium and Select Uranium Isotopes)

Sample	U-234 (pCi/g)	Uncertainty (pCi/g)	U-235 (pCi/g)	Uncertainty (pCi/g)	U-238 (pCi/g)	Uncertainty (pCi/g)	Total Uranium (mg/kg)
14100010	3.8	2.6	1.60 U	2	12.2	4.7	28
14100011	30600	5500	4100	1100	231000	39000	670000
14100012	30700	5600	3900	990	209000	36000	630000
14100014	27500	5000	4200	1100	198000	34000	610000
14100016	23000	4100	3060	790	165000	28000	480000
14100017	22100	3900	3010	780	155000	26000	470000
14100021	35100	6200	7100	1600	264000	44000	810000
14100024	52800	9400	6200	1700	386000	65000	990000
141001022	1800	360	246	54	13100	2600	31000
141001023	65	12	5.84	0.97	446	76	1200

pCi/g = picocuries per gram
mg/kg = milligram per kilogram
U = Sample result was not detected above the Minimum Detectable Activity
U-234 = uranium-234
U-238 = uranium-238

5.2.4 Quality Assurance/Quality Control

Quality Assurance (QA)/quality control (QC) data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware, and reagents. Specific QC requirements for laboratory analyses are incorporated in the EPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (EPA 2011) and the analytical methods used for analytical work on the project. This section describes the QA/QC measures taken for the project and evaluates the usability of data presented in this report.

Data from the START-subcontracted commercial laboratory were reviewed and validated by a START chemist. Data qualifiers and labels were applied as necessary according to the EPA guidelines (EPA 2009, EPA 2010). In the absence of other QC guidance, QC limits associated with a specific method and/or standard operating procedure were also utilized to apply qualifiers to the data. OSC Weigel determined that definitive data without error and bias determination would be used for the sampling and analyses conducted during the field activities. The data quality achieved during the field work produced sufficient data that met the data quality objectives (DQOs) stated in the Site-Specific Sampling Plan (E & E 2014a).

QC samples included matrix spike/matrix spike duplicate (MS/MSD) and/or blank spike (BS) samples at a rate of one MS/MSD and/or BS per 20 samples per matrix. The laboratory data were reviewed against the laboratories' abilities to meet project DQOs for precision, accuracy, and completeness and the field team's ability to meet project DQOs for representativeness and comparability. Precision measures the reproducibility of sampling and analytical methodology and is defined as the relative percent difference (RPD) between duplicate sample analyses. Accuracy indicates the conformity of the measurements to fact and is defined as the MS/MSD/BS percent recoveries (%Rs) for all laboratory analyses. Data completeness is defined as the percentage of usable data. Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point or environmental condition. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. The QA reviewer for this project determined that the DQOs for representativeness and comparability were met for all samples collected from the Boise Radiation Apartment site.

The QA procedure identified the following:

- All duplicate results were within QC limits for soils and a total of 22 results (approximately 9.4% of the data) were outside QC limits for bulk samples; however, both of these results met the project DQO for precision of 90%.
- All %R results were within QC limits for both soils and bulk material; therefore, the project DQO for accuracy of 90% was met.
- No sample results were rejected; therefore, the project DQO for completeness of 90% was met.

The laboratory data also were reviewed for holding times/temperatures/sample containers, laboratory blank samples, and serial dilution analyses. For soil and product samples, all holding times, sample temperatures, and containers were acceptable; no potential contaminants of concern were detected in the laboratory blanks; and all serial dilution analyses were within QC limits. See Attachment C-1 for data validation memoranda for details on the findings of the quality assurance procedures.

In addition to the routine sample and analysis QA/QC performed above, with the arrival of regional EPA radiological assessment capabilities, daily routine checks of all instrumentation used on site were performed consisting of a bump calibration with a known calibration standard. The instrument was determined to be in working condition if a result registered at the same order of magnitude each day.

5.2.5 Community Relations

On October 12, OSC Weigel, CIC Kay Miller, Public Information Officer Mark McIntyre, and a scientist with DOE RAP attended a community meeting in the Hobble Creek complex to

communicate the purpose of EPA's actions at the site and answer any questions regarding potential risks of these activities.

Additionally, on October 13, OSC Weigel gave two on-air interviews with local news media to communicate the purpose for EPA actions at the site. He also participated in two print media interviews, which were published between October 14 and 15.

5.2.6 Health and Safety

Dosimetry precautions were continued on site, including the use of thermoluminescent dosimeters (TLDs) and direct-read dosimetry during entry to the exclusion zone. Results of air sample dosimetric calculations reaffirmed the finding by DOE RAP HPs that airborne contamination presented low risk to human health. Regardless, the level of protection was maintained at Level C for precautionary purposes until the removal of the hazardous substances and radiological materials was completed.

5.3 Site Operations – October 14 to 16, 2014

5.3.1 Removal Activities

Primary removal activities on October 14 consisted of an entry made by START and ERRS personnel in Level C protection to segregate chemical and radiological hazards from the apartment. Known or suspect items were visually assessed and placed in one of two areas on plastic sheeting if determined to be either a hazardous substance or a radiological material. Items that were damaged, leaking, or otherwise not contained were double-bagged in resealable plastic bags to avoid release of these materials. Several items containing mercury were identified during the segregation process. Visual evidence suggested that none of the items appeared to have released mercury; however, EPA contacted the Boise Fire HazMat Team in coordination with IDEQ to acquire a Lumex mercury vapor analyzer, which uses a cold-vapor Zeeman spectroscopy detector to measure mercury vapors in ambient air. The segregation process continued throughout the day on October 14 and concluded with the entry team clearing the decontamination station with all equipment and materials.

Clearance of sidewalk contamination continued on October 14. All locations were scabbled by this time, and instrument scanning indicated that the contaminated areas were reduced to below the site action level; however, swipe testing was not completed until October 15, which also confirmed the areas were below the site action level.

On October 15, entry to the apartment unit was made to begin the process of removing the items from the unit. Level D protection was permitted during this entry because all materials had been stabilized in secondary containment within 5 feet of the entry to the unit. Initially, only chemical hazards were removed from the apartment to prepare for hazard categorization testing. Each item passed through decontamination at the control point and was screened using G-M detectors. Swipe samples were taken on the exterior of items exhibiting in-situ screening values above the site action level. The items that passed this screening procedure were assigned a numerical identifier, then transported to Garage #14 for secure storage before hazard categorization

After removal of the chemical hazards from the unit, the Boise Fire HazMat Team arrived on site with the Lumex mercury vapor analyzer. One START member and one ERRS responder entered

the unit in Level C protection and screened the unit for mercury in ambient air. Results of the mercury survey showed no results above background concentrations.

On October 16, one additional START responder and EPA Commander Royce arrived on site. With all chemical hazards in secure storage, START personnel staged the EPA Level A Truck in front of Garage #14 to provide safe access to the chemical hazards slated for hazard categorization testing. Hazard categorization was performed using a variety of chemical tests referred to as the First Step method. This method is used to identify hazardous characteristics of a substance such as corrosivity, flammability, toxicity, or oxidation potential.

An additional entry was made as hazard categorization testing was underway. The purpose of this entry was to remove the bags of household waste on the porch of the apartment. Approximately 20 bags were consolidated in several 50-gallon waste bags and transported to Garage #16. The bags were passed through the control point and confirmed to be free of any exterior contamination. In Garage #16 an initial attempt was performed to screen the solid waste bags by screening the exterior of the bag and then opening them to spot check items visually deemed suspect. Upon completion of screening four bags of household waste, site activities were concluded for this operational period.

5.3.2 Waste Management

Primary waste management activities included coordination with the facility contracted by ERRS to receive radiological wastes generated at the site. A representative with US Ecology Idaho, Inc. (US Ecology) arrived on October 15 to provide information regarding the types of material that could be accepted for disposal. The facility was limited by the concentrations of radioactivity that could be accepted for long-term disposal; OSC Weigel inquired into using the facility as temporary storage for wastes that could not be disposed of there, and US Ecology stated they could accommodate that need.

As described above, chemical hazardous substances were removed from the apartment and securely stored in Garage #14. Additionally, approximately 20 bags of solid waste that were slated to be screened for radioactive contamination were staged in Garage #16; although the unit could not be secured, this plan was approved by OSC Weigel because of the low threat presented by the waste with consideration that on-site security would monitor any attempted access to the garages overnight.

5.3.3 Sampling and Monitoring Activities

Routine air sampling continued in conjunction with entries to the unit. Results of air sampling continued to indicate a low threat of internal exposure above background during operations in the unit. As a result, EPA Commander Royce recommended that after all radiological materials were removed from the unit, the level of protection for entry to the unit may be reduced to Level D. OSC Weigel concurred with this determination.

5.3.4 Quality Assurance/Quality Control

Additional daily instrument operational check procedures were implemented upon recommendation by EPA Commander Royce. All instruments used during in-situ screening or decontamination screening were assessed daily for efficiency and tolerance based on performance with calibration check sources. The results of these tests were recorded daily and maintained in a spreadsheet in the site file.

Additional data collection tools were deployed to capture in a database instrument readings and removed items. A data manager was deployed to maintain and assess the numerous data sources being generated daily in coordination with data collection team members. The data manager audited the data sources for completeness and correctness on a daily basis. When data gaps were identified, this information was relayed to project managers or field team leaders to correct or re-collect, as needed.

5.3.5 Community Relations

Public Information and Community Involvement personnel demobilized from the site during this operational period. OSC Weigel participated in one additional on-air interview prior to their demobilization.

5.3.6 Health and Safety

As stated in Section 5.3.3, the level of protection was reduced to Level D for entries to the apartment upon removal of all radiological materials from the unit.

5.4 Site Operations – October 17 to 20, 2014

5.4.1 Removal Activities

On October 17, as hazard categorization testing continued, the vehicle owned by the male tenant, a 2008 Hyundai Tiburon was screened for radioactive contamination. No radioactive contamination was detected in the front and mid-section exterior or in the vehicle interior. Upon screening of the rear area, results showed values peaking at 900 cpm on a G-M probe, exceeding site action levels by an order of magnitude. The contamination was also identified on various items in the trunk, including a broken plate and a piece of commercially available ceramic material containing uranium NORM, the rear bumper, and on carpeting in the trunk, including a removable spare tire cover. See Figure 3-D for a map of locations sampled and results of this survey. Based on these results, the vehicle underwent decontamination. The contaminated items found in the trunk were double-bagged in resealable bags, along with carpeting removed from the rear of the trunk. Contamination found on the bumper was wiped away using a biodegradable cleaner *on a paper towel*. Decontaminated areas were rescreened, and results were below the initial site action level. Following decontamination, the vehicle was released back to the owner.

Also on October 17, START and ERRS began a more detailed screening procedure for the household waste which was now stored in Garage #16. The screening process consisted of removing the solid waste from the bags, then screening the items to the initial site action level. Items exceeding the site action level were subsequently swiped to determine if external contamination was present. Air samples were collected during the garbage screening capable of detecting airborne radioactive contamination. The garbage screening and air sampling continued until October 18; no results above the site action levels were detected.

On October 18, OSC Mike Boykin arrived on site to assume command of site operations as OSC Weigel demobilized. Hazard categorization testing began on the radioactive materials and mixed wastes removed from the apartment and staged in Garage #14 on October 15. The method used for hazard categorization described above, the First Step method, was modified due to the potential for generating airborne radioactive contamination by this process. As a result, no material was burned, vaporized, or acidified that could potentially generate vapors with radioactive components. Results of the modified hazard categorization procedure identified three radioactive liquids that were corrosive and one that was also positive as an oxidizer. A waste

shown to exhibit at least one of the hazard categories as well as be radioactive is described as a mixed waste. Mixed wastes are a specific category of wastes which cannot be disposed of with hazardous substances and must be segregated from radioactive-only wastes.

On October 18, an entry was made to screen the concrete floor and railings of the porch for radioactive contamination. In-situ screening and wipes were collected showing contaminated concrete primarily in areas where contaminants were discovered, including the spilled powder and a Tupperware container of mixed radiological liquids. See Figure 3-B for a map of locations sampled and results of this survey. Based on this assessment ERRS performed the same scabbling technique on the porch as was performed on the exterior of the unit. This process continued until October 20, when the final clearance survey of scabbled locations confirmed all contamination on the porch was reduced to below the site action level. See Figure 4-A for a map of locations sampled and results of this survey.

On October 19, two additional EPA personnel arrived on site with specialized training in radiological response; the personnel are part of a volunteer corps called Radiation Task Force Leaders (RTFL) within EPA. The two RTFL personnel were integrated into the entry teams and were prepared to lead efforts in the unit to decontaminate the apartment interior. As part of preparations for this, the EPA HP on site recommended that the site action level for in-situ screening be modified to a more stringent value for clearance surveys. The new site action level was recommended as two standard deviations above mean background for the unit; OSC Boykin approved use of this action level for the remainder of site operations. Background was established based on results from a survey of an unoccupied apartment not expected to have been impacted by radiological materials.. From this set of values, a standard deviation was calculated and twice that value was added to the background to establish the site action level. Generally, background ranged between 0 to 1.6 cpm on the ZnS probe and 50 to 75.4 cpm on the G-M probe.

The in-situ screening of the apartment interior led by EPA RTFL personnel began on October 20. The RTFL personnel performed the screening and identified locations above the daily site action level while START personnel documented the process. In addition to fixed locations, personal property was screened for radioactive contamination. If an item was determined to be contaminated or was identified as a radioactive material not yet removed from the unit, it was staged near the entry for later processing through the control point and on to the secure storage in Garage #14. Numerous additional contaminated items and radiological materials were identified during this process. On October 20, screening was initiated in the bedroom and bathroom, where the bulk of radioactive material was identified during the initial assessments; screening of these areas continued beyond October 20.

Due to the increase of personnel and resources at the site, a need arose to store resources and expendable supplies in an overflow area. OSC Boykin requested from the property managers the use of a vacant garage unit in which to store these items. The property manager provided Garage #6 for this purpose.

5.4.2 Waste Management

Primary waste management activities during this operational period consisted of staging all radioactive and chemical wastes from the apartment and vehicle decontamination in Garage #14. Additionally, solid waste from the porch unit was staged in Garage #16 until a clearance survey of the items could be performed. Once the waste was cleared of any radioactive contamination it was placed in the apartment complex solid waste dumpsters.

5.4.3 Sampling and Monitoring Activities

Routine air sampling continued in conjunction with entries to the unit, as well as during garage screening. Results of the air sampling continued to indicate a low threat of internal exposure above background levels during operations in the unit. Results of air sampling from the garage screening activities determined that no threat of exposure above background occurred during the garbage screening.

5.4.4 Health and Safety

Although operations in the apartment unit had been reduced to Level D protection level for ongoing cleanup work, activities associated with decontamination of the porch area were performed in Level C due to the potential of airborne radioactive contamination to be generated in the immediate area of the scabbling. Level C protection was also worn during the screening of solid waste in Garage #16 due to the unknown makeup of material in the solid waste stream. Initiation of the in-situ screening for clearance of the interior was performed using Level D protection.

5.5 Site Operations –October 21 to 28, 2014

5.5.1 Removal Activities

In-situ screening continued in the primary bedroom and bathroom area on October 21. During screening, the need arose to establish a place to store decontaminated items without removing them from the unit. As a result, screening activities were transitioned to the secondary bedroom and bathroom, which was suspected of having little to no radiological contamination. The area was screened clear of contamination above site action levels by October 22 and was used to store items cleared of contamination from the rest of the apartment for the remainder of site activities. Decontamination of the primary bedroom and bathroom continued until October 22; this process included segregation of contaminated versus uncontaminated personal items, removal of all carpeting in this area, and wiping clean of any contaminated surfaces. A swipe clearance survey of the area was performed to confirm no removable contamination remained above the site action level. Results of the swipe survey did not identify any residual contamination above the site action level. See Figure 4-B for a map of locations sampled and results of the survey. Upon clearance of the most contaminated areas, including the porch and primary bedroom and bathrooms, in-situ clearance surveys of the kitchen, living room, and entry to the unit commenced on October 22.

In conjunction with the ongoing screening, OSC Boykin requested entry teams to remove drain traps from the sinks installed in the unit based on concerns that NORM/TENORM may have been disposed of down sinks. Three drain traps were removed for testing of sludge—one from each bathrooms and one from the kitchen. Hazard categorization testing performed on the sludge found that it exhibited no hazardous properties; however, analysis of the sludge in the radiological field laboratory returned results above the site action level, with the bathroom used by the male tenant to process NORM having a significantly higher result. Results of sludge from the kitchen did not exceed the site action level.

On October 23, DOE RAP mobilized back to the site to assist EPA in characterizing the waste stream for isotopes that the disposal facility had stated it could not accept, including transuranic isotopes. The DOE used field-portable gamma spectroscopy to characterize the hazards in the

waste stream. This process occurred over three days as results were collected and interpreted by off-site analysts. The final results confirmed that all Am-241 had been segregated out of the waste stream; identified certain industrial isotopes that had been isolated; and verified that the remainder of the waste stream consisted of NORM/TENORM. The DOE also provided results to EPA identifying certain specific samples of interest as DU.

On October 24, OSC Weigel remobilized to the site to relieve OSC Boykin as EPA representative on site. OSC Weigel fulfilled this role for the remainder of site operations. On October 26, in-situ screening of the apartment interior was completed; all carpeting was removed from the living room area due to areas of contamination identified during screening. Surfaces were wiped clean to remove any contamination, and a swipe clearance survey was subsequently performed to confirm that no removable contamination remained. Results of the swipe survey did not identify any residual contamination above the site action level. See Figure 4-C for a map of locations sampled and results of the survey.

On October 27, based on the results of all activities at the site, OSC Weigel met with the property manager to discuss the condition of the apartment unit and the procedure for returning access back to the female tenant. OSC Weigel stated that all carpeting was removed from the unit except in the secondary bedroom and that sink drains required replacement. The property managers stated that due to the damage to the apartment unit as a result of the tenants actions, the female tenant would be evicted from the unit effective October 31. This timeline raised the need to transfer the unit to the female tenant's access quickly to give her suitable time to remove the remaining uncontaminated personal items in the unit. Also, since the waste stream was stored in the garage assigned to the female tenant, reoccupation was also contingent on removal of the wastes from the garage. OSC Weigel presented the property managers with a plan to transfer the waste stream from Garage #14 to the unoccupied Garage #6. The property managers agreed to this plan as long as the wastes were stored in the space for one week or less. ERRS and START consolidated the radioactive waste and the packaged chemical waste to Garage #6 on October 28. A swipe survey of Garage #14 and #16 were performed to determine if any residual contamination was present due to EPA activities in the unit. One swipe location was identified in Garage #14 above the site action level and was wiped clean using a biodegradable cleaner and resurveyed to below the site action level. On October 28, OSC Weigel returned access of the apartment and all uncontaminated personal property back to the tenants. A complete list of all hazardous substances and/or contaminated personal property that was removed from their possession was provided to the female tenant upon demobilization from the site.

On October 27, OSC Weigel received information regarding a second storage unit in the male tenant's custody at a separate facility. Based on this information, OSC Weigel directed START to reassess the initial unit screened as well as the newly-discovered unit. EPA and START mobilized to the administrative office of the storage unit company to gain access to the units. The owner of the facility provided consent for access to both units, and START entered to screen for radioactive materials or contamination. First, START accessed the unit at 600 North Maple Grove Road that had previously been surveyed and immediately found a sample of DU stowed in a tool box; however, no evidence of radioactive contamination was present. Next, START mobilized to 1450 North Mitchell Street, Unit #R-12. START accessed this unit in modified Level D protection to perform a rapid screen of the interior. A damaged commercially available item containing radium TENORM was immediately identified, as well as contaminated items such as a belt sander and other tools. Based on the initial assessment, START backed out of the unit and secured it for further characterization upon conclusion of site activities at the apartment unit.

5.5.2 Waste Management

Waste management and disposal activities included coordination with DOE RAP to characterize the waste stream for proper segregation of excluded wastes from the US Ecology facility. Over three days, DOE tested the waste stream and assisted START and ERRS in properly categorizing the radiological wastes.

ERRS packaged the waste into overpacks by United States Department of Transportation hazard class based on hazard categorization results provided by START personnel. This waste stream and the radiological wastes were moved from its former storage in Garage #14 to Garage #6 due to the need to return access of the site and associated structures to the female tenant upon completion of removal activities on October 28.

One sample of DU discovered at the storage unit on Maple Grove Road was transported to the facility at North Mitchell Street and stored at that facility after radioactive materials and contamination was identified in that unit.

5.5.3 Sampling and Monitoring Activities

Sampling and monitoring activities ceased at the apartment on October 27 after completion of removal activities in the unit. Results of air sampling during this operational period detected no threat of exposure above background at the site.

5.5.4 Community Relations

A final community meeting was held by OSC Weigel at the Renaissance Apartment complex with residents. On October 28, OSC Weigel stated that activities at the site were concluded and that no hazardous materials or radioactive contamination were detected during final clearance surveys. He answered any questions the residents had and then concluded the meeting.

5.6 Storage Shed Operations/Demobilization – October 29 to 31, 2014

5.6.1 Removal Activities

On October 29, all remaining EPA, START, and ERRS personnel arrived at the Boise Radiation site to load the radioactive wastes into a GSA government vehicle for emergency transport of the waste stream to the US Ecology facility in Grand View, Idaho. IDEQ personnel were present to oversee the transfer of the waste to the facility and facilitated a secure transport with Idaho State Highway Patrol. OSC Weigel, one START member, and one ERRS responder departed the site with the waste while the remaining personnel transitioned operations to the storage unit on North Mitchell Street.

Upon return of the waste transport team, operations commenced at the storage unit, consisting of in-situ screening of all items in the unit. Background measurements were taken at Unit #R-17, which was used to determine the site action level as well as serve as the radiological field analytical station. Items that were cleared of contamination were also stored in Unit #R-17 until clearance of Unit #R-12 was completed. In addition to the items discussed in Section 5.5.1, other industrial radiological isotopes and contaminated items were identified. These items were isolated in a cleared section of Unit #R-12 until completion of the screening procedure, which was completed on October 30. A swipe clearance survey was subsequently performed, and results of the survey showed no locations above the site action level.

On October 31, EPA personnel transported all items discovered at the unit, as well as the DU, in a GSA vehicle to the disposal facility in Grand View, Idaho. The remaining personnel demobilized from the Boise Radiation site with all response assets.

5.6.2 Waste Management

Radiological waste from the Boise Radiation Apartment were transported to US Ecology facility by EPA personnel on October 29, and waste discovered at the storage units associated with Boise Radiation Apartment response were transported to the disposal facility in Grand View, Idaho, on October 31. Additionally, the chemical wastes from Garage #6 at the Boise Radiation Apartment site were transported on November 1 to the disposal facility in Kent, Washington, by the disposal facility.

5.6.3 Sampling and Monitoring Activities

Sampling and monitoring activities were performed at the North Mitchell Road storage unit during all screening activities. Results of the air samples detected no threat of exposure above background at the storage unit.

5.6.4 Health and Safety

Level of protection in the North Mitchell Road storage unit was maintained at Level C due to the uncharacterized threat in the unit. Dosimetry was maintained at the site for external dose and included in any dose calculations obtained from the Boise Radiation site.

5.7 Treasure Valley Removal Action: Boise Metal Works – December 8 to 11, 2014

5.7.1 Background

After demobilization from the Boise Radiation Apartment site, information was obtained regarding the male tenant's activities in acquiring DU. Specifically, the information indicated that the male tenant had visited the Boise Metal Works facility during 2014 to have samples of DU cut from the much larger sample observed in the male tenant's vehicle on October 8. As a result, on December 3, 2014, NRC inspectors visited the facility located at 11400 West Executive Drive, Boise, Ada County, Idaho (see Figure 1-B for a site location map and Figure 2-B for the site map). This property is located in a business park with commercial-industrial properties surrounding the site.

The NRC inspectors interviewed the operators of the facility, who stated that the male tenant had done business with them in the past. The operators stated that the male tenant requested that a sample of what they claimed to be tungsten metal be cut and grinded to remove any oxidation (oxidation appears as black color) from the surface. The cutting was performed on a large, floor-mounted water jet cutter, and the grinding was performed on a wide belt grinder. The jet cutter uses a stream of water and abrasive material (coarse granular material) to cut the metal; the waste water/abrasive is collected in a grit catch. The belt grinder has a dust bag at the rear drum to catch the ejected waste metal particulates.

Based on this information, OSCs Mike Boykin and Angelica Zavala mobilized START to the Boise Metal Works facility on December 8 to perform an emergency removal assessment at the facility.

5.7.2 Removal Activities

EPA and START arrived at the Boise Metal Works facility on December 8 and made contact with the facility operators. Subsequently, START performed in-situ screening of the facility exterior, working towards the interior office space and common areas. Results of the survey showed no detections above the site action level, as established at the Boise Radiation Response of two standard deviations above background, in these areas. Next, START entered the metal shop and screened throughout the interior, focusing on egress pathways from the grinder and water jet cutter staged within 10 feet of each other. No detections above the site action level were noted except during screening of the wide-belt grinder dust bag. The dust bag was immediately secured by double bagging it in a large trash bag, taping it shut, and placing it under custody. Further assessment of the belt grinder showed internal contamination of the belt housing. The unit was covered and remained covered until decontamination could be attempted.

The worker who had performed the grinding work on the DU brought in his clothes and boots worn during the last DU grinding work. The START performed in-situ screening and swipe sampling of the worker's personal effects and found no detections above the site action level. Additionally, the START screened the driver's seat, pedals, and steering wheel areas of the worker's teal Chevrolet Z71 truck and found no detections above the site action level.

On December 9, START performed decontamination of the internal areas of the belt grinder by wiping away dust and debris using a biodegradable cleaner. A slag-like metal material found on the rear of the housing at the dust bag inlet was measured to be above 400 cpm and was chipped off the unit, then double-bagged in resealable bags. Based on the findings of the belt grinder, the EPA OSC, requested that START collect sediment samples from the grit catch of the water jet cutter to determine if any residual contamination was present in the unit; as well as a dust sample from the dust bag for laboratory analysis.

Prior to demobilization from the site, operators of the Boise Metal Works facility stated that their facility used to operate at a separate location behind the current building at 11347 West President Drive and that the male tenant had initially used their services while operating at that location. As a result, EPA and START conducted an assessment of the location where the equipment was located in the former facility and results of the in-situ screen and swipe survey indicated no measurements above the site action level.

Upon completion of decontamination and sampling activities, a swipe clearance survey was performed to determine if any contamination remained at the site. Results of this survey showed no detections above the site action level. Based on this, radioactive material and IDW were placed in a 5-gallon bucket, and transported to the US Ecology facility in Grand View, Idaho, in an EPA-licensed vehicle. A community meeting was held with workers and operators of the Boise Metal Works facility in conjunction with the Idaho Department of Health and Welfare Public Health District 4 to describe the potential risks associated with the radiological material formerly present in the workplace.

5.7.3 Sampling and Monitoring Activities

As stated in Section 5.7.2, two sediment samples were collected from the grit catch of the water jet cutter used to cut the DU samples. Additionally, one composite sample was collected from the dust bag of the belt grinder used to remove oxidation from the DU sample. The samples were labeled, packaged, and submitted to the ALS Environmental laboratory in Fort Collins, Colorado, for analysis of total uranium according to EPA SW-846 Method 6020 by Inductively Coupled

Plasma and Mass Spectrometry, and isotopic uranium according to ASTM D3972 by Alpha Spectroscopy. Significant detections of uranium and certain uranium isotopes were noted in both the sediment and dust samples. Table 5-3 summarizes the product sampling results.

Table 5-3 Treasure Valley Removal Action Bulk Sample Results (Total Uranium and Select Isotopes)

Sample	Matrix	U-234 (pCi/g)	Uncertainty (pCi/g)	U-235 (pCi/g)	Uncertainty (pCi/g)	U-238 (pCi/g)	Uncertainty (pCi/g)	Total Uranium (µg/kg)
14120101	Sediment	0.39	0.12	0.008 U	0.031	0.29	0.1	200
14120102	Sediment	0.5	0.17	0.025 U	0.047	0.4	0.15	510
14120103	Dust	11.9	2.5	1.53	0.66	88	15	260000

µg/kg = microgram per kilogram
pCi/g = picocuries per gram
U = Sample result was not detected above the Minimum Detectable Activity
U-234 = uranium-234
U-235 = uranium-235
U-238 = uranium-238

Additionally, one air sample was collected each day (a total of two) during survey activities in the metal shop work area for determination of internal exposure. The samples were initially analyzed in the radiological field laboratory according to the site-specific sampling plan (E&E 2014a) and then labeled, packaged, and submitted to the ALS Environmental laboratory in Fort Collins, Colorado for analysis of:

- Total uranium according to EPA SW-846 Method 6020 by Inductively Coupled Plasma and Mass Spectrometry;
- Isotopic uranium according to ASTM D3972 by Alpha Spectroscopy; and
- Gross alpha/beta counts according to an internal laboratory procedure.

5.7.4 Quality Assurance/Quality Control

QC samples included MS/MSD and/or BS samples at a rate of one MS/MSD and/or BS per 20 samples per matrix. The laboratory data were reviewed against the laboratories' abilities to meet project DQOs for precision, accuracy, and completeness and the field team's ability to meet project DQOs for representativeness and comparability.

The QA procedure identified the following results. All duplicate RPDs and MS/MSD/BS %R results were within QC limits, and no sample results were rejected; therefore, the project DQO for precision, accuracy, and completeness of 90% was met. The QA reviewer determined that the DQOs for representativeness and comparability were met for all samples collected from the Treasure Valley Removal Action Support site.

The laboratory data also were reviewed for holding times/temperatures/sample containers, laboratory blank samples, and serial dilution analyses. All holding times, sample temperatures, and containers were acceptable, no potential contaminants of concern were detected in the laboratory blanks, and all serial dilution analyses were within QC limits. . See Attachment C-2 for data validation memoranda for details on the findings of the quality assurance procedures.

5.7.5 Community Involvement

EPA, in conjunction with the Idaho Department of Health and Welfare Public Health District 4, held a community meeting with workers and operators of the Boise Metal Works facility to

discuss the risks and health outcomes associated with exposure to NORM particulate. OSC Zavala led the meeting with Idaho Public Health District staff providing technical information. The meeting concluded with a question and answer period with the workers addressing the potential exposure.

5.7.6 Health and Safety

All site activities at the Boise Metal Works facility were performed using Level D protection. Since no gamma-emitting isotopes were expected to be present at the site in large concentrations, no external dosimetry was donned other than TLD badges during site activities. Internal exposure was tracked according to air sampling results, which were both analyzed in the radiological field laboratory and submitted for subcontract laboratory analysis.

5.8 Treasure Valley Removal Assessment: Eldorado Apartment Screening – January 21, 2015

5.8.1 Background

Upon demobilization from the Boise Metal Works facility, EPA received information indicating that the male tenant may have performed similar operations associated with the processing of NORM/TENORM as those conducted at the Boise Radiation Apartment site at a former residence. EPA and NRC investigators identified one property of concern that the male tenant had occupied prior to the Boise Radiation Apartment site where this may have occurred. The residence, an apartment in a multi-family structure associated with the Eldorado Apartment complex, was found to be occupied by a new tenant, but no further information was available regarding the condition of the apartment. On January 21, 2015, EPA mobilized to 3905 Idaho Avenue, Apartment 103 in Caldwell, Canyon County, Idaho (see Figure 1-C for a site location map and Figure 2-C for the site map) to perform a removal assessment at the property and determine if any radioactive contamination was present. The property is adjacent to undeveloped grassland to the north and residential properties associated with the Eldorado Apartment complex to the west, south, and east.

OSC Weigel contacted Park Place Property Management, property managers for the Eldorado Apartment complex, on January 20, 2015, to notify them of the need to inspect the property to determine if any residual contamination was present at the property. Subsequently, OSC Weigel contacted the current resident of Apartment 103, in coordination with Park Place Property Management staff, to gain access to the unit and allow for all site activities to be performed. The current tenant and property manager granted consent access for this purpose.

5.8.2 Removal Assessment Activities

EPA and START arrived on site to prepare for in-situ screening and swipe sampling of the interior of the apartment in Caldwell, Idaho. The nature of in-situ screening is that precision is generally low due to the variation of natural background and the detection limit capable by in-situ screening instruments; however, precision can be improved by increasing the number of results recorded for a given area. Therefore, START deployed a telemetric device capable of transmitting all data points generated from the in-situ screening instruments to a laptop capable of recording the incident data. This data set can then be compared to a representative data set generated from a model background unit to determine if variations in the data set exceed the site action level for in-situ screening previously established as twice background.

The background unit was selected the day prior to arrival at the site at a hotel near the Caldwell apartment, as no vacant unit similar to the target unit was available at the Eldorado complex. The background unit was scanned for each type of building material expected to be encountered at the site, including carpeting, walls, tile, linoleum, and wood. For building material types encountered in the target apartment not encountered in the background unit, the most conservative background was selected.

In-situ screening was performed on the exterior of the apartment unit by scanning the sidewalks and landing to the unit as well as the unscreened back porch. While transitioning from the front of the apartment to perform screening in the rear, instruments detected an irreproducible reading above the site action level from grass on the exterior of the apartment. A decision was made by OSC Weigel, in consultation with EPA Commander Royce, to collect soil at this location. In-situ screening of soil and vegetation is inherently problematic due to the difficulty in acquiring accurate readings from this type of media; however, due to the record of this result above the action level, OSC Weigel elected to collect a sample to confirm or deny the presence of any radioactive material. Results of the soil sample analysis showed no significant deviation from background concentrations of uranium.

The in-situ screening procedure was next performed on the interior of the apartment according to the Draft Work Plan written for the site (E & E 2015). The screening was performed on all fixed horizontal surfaces as well as vertical surfaces up to 3 feet above surface level. Swipe samples were collected at intervals of 10 square feet, where accessible without the need to move personal or delicate items and furniture. Results of the swipe survey did not identify any locations above the site action level. Processing of the data set associated with the in-situ screen was required in order to perform a final determination of the presence or absence of radioactive contamination. Results of the comparison to background found that in general, results were below the site action level by appropriate building material type. Some types of media, such as linoleum, showed results above the comparison site action level; however, no linoleum was screened as part of the background assessment. Typically, linoleum can present false positives if an appropriate background is not obtained for this type of building material, due to its highly reflective nature. Beyond these discrepancies, several carpet and wall screens, primarily in the living room area (as well as wall screening in the bathroom) and exclusively as detected on a G-M detector, exceeded the site action level; however, this exceedance was less than 5% of the detected value. This value is well below the instrument's minimum detected activity, although above the estimated lower limit of detection. These values above the site action level are expected to some statistically-acceptable degree and have been determined not to be indicative of contamination.. See Figures 5-A and 5-B for results of the swipe clearance survey and Attachment D for the collection of VIPER surveys graphically depicting the in-situ scan locations by building material and type of radiation.

5.8.3 Sampling and Monitoring Activities

Based on an irreproducible in-situ screening value above the site action level from the exterior of the apartment, the decision was made to collect one soil sample at the general location of the reading. An additional background reading was acquired for purposes of comparability. The soil samples were labeled, packaged, and submitted to the ALS Environmental laboratory in Fort Collins, Colorado, for analysis of total uranium according to EPA SW-846 Method 6020 by Inductively Coupled Plasma and Mass Spectrometry, and isotopic uranium according to ASTM D3972 by Alpha Spectroscopy. No results above background were noted in the sample.

Additionally, two air samples (one for each level of the apartment) were collected during survey activities in the apartment unit for determination of internal exposure. The samples were initially analyzed in the radiological field laboratory and then labeled, packaged, and submitted to the ALS Environmental laboratory in Fort Collins, Colorado, for analysis of:

- Total uranium according to EPA SW-846 Method 6020 by Inductively Coupled Plasma and Mass Spectrometry;
- Isotopic uranium according to ASTM D3972 by Alpha Spectroscopy; and
- Gross alpha/beta counts according to the internal laboratory procedure.

Results of air sampling showed no threat of exposure above background.

5.8.4 Quality Assurance/Quality Control

QC samples included MS/MSD and/or BS samples at a rate of one MS/MSD and/or BS per 20 samples per matrix. The laboratory data were reviewed against the laboratories' abilities to meet project DQOs for precision, accuracy, and completeness and the field team's ability to meet project DQOs for representativeness and comparability.

Results of the QA procedure identified the following results. All duplicate RPDs and MS/MSD/BS %R results were within QC limits and no sample results were rejected; therefore, the project DQO for precision, accuracy, and completeness of 90% was met. The QA reviewer determined that the DQOs for representativeness and comparability were met for all samples collected from the Treasure Valley Removal Assessment Operation site.

The laboratory data also were reviewed for holding times/temperatures/sample containers, laboratory blank samples, and serial dilution analyses. All holding times, sample temperatures, and containers were acceptable and all serial dilution analyses were within QC limits. Gross beta and U-235 were detected in method blanks (see the data validation memoranda in Attachment C-3 for sample results qualified based on blank detections).

5.8.5 Health and Safety

All site activities at the Eldorado Apartment Screening facility were performed using Level D protection. Since no gamma-emitting isotopes were expected to be present at the site in large concentrations, no external dosimetry was donned other than TLD badges during site activities. Internal exposure was tracked according to air sampling results, which were both analyzed in the radiological field laboratory and submitted for subcontract laboratory analysis.

5.9 Post-field Activities – January-March, 2015

5.9.1 Removal Activities

All field activities associated with the Boise Radiation Apartment and Treasure Valley Removal Assessment/Removal sites were concluded on January 21, 2015; however, the need to find a suitable disposal facility for the radioactive waste stored at the US Ecology facility in Grand View, Idaho, was still required. During February and March 2015, ERRS contractors coordinated with US Ecology to determine which bulked material could be permanently disposed of at that facility and which items exceeded the facility license for activity concentration. In general, the facility accepted any NORM such as unprocessed ores, commercially available ceramic materials

containing surface NORM, and certain IDW determined to be below a specific activity concentration by swipe analysis performed by ERRS and confirmed by US Ecology personnel.

All other wastes determined to be low-level radioactive waste or surface-contaminated objects exceeding the US Ecology activity concentration limits were packed and transported to the a radiological disposal and mixed waste facility in Richland, Washington.

6. SUMMARY AND CONCLUSIONS

6.1 Boise Radiation Apartment Removal

On October 10, 2014, EPA, START, and ERRS contractors mobilized to the Boise Radiation Apartment site located at 6342 North Park Meadow Way in Boise, Ada County, Idaho, after notification of the presence of radioactive materials and probable contamination format the address. The mobilization occurred under joint request by IDEQ and NRC. Initial site actions included obtaining consent for access to the apartment unit, associated garages, personal property and vehicles, then screening the tenants outside of the unit to control the spread of radioactive contamination off site.

Hazardous substances and radioactive materials were identified throughout the apartment unit. The materials were apparently in various stages of a chemical process converting NORM to TENORM, from natural source material to chemically processed liquids and solids. Contamination was identified outside the unit on sidewalks and stairwells leading from the apartment as well as in vehicles owned by both the tenants. Based on this information, an emergency removal was performed of all hazardous substances and radioactive materials as well as contaminated personal property and building materials from inside the apartment unit.

Two storage units were screened based on information that the male tenant had accessed these units. Additional chemical containers and radioactive materials were identified at these locations. After removal of the wastes, the units were screened clear of residual contamination. Wastes from the apartment site and the storage unit were then transported to the US Ecology facility in Grand View, Idaho. In total, 20 hazardous substance overpacks and 140 radioactive materials or contaminated items were removed from the site.

6.2 Treasure Valley Assessment/Removal Operations

A subsequent investigation was initiated based on information that the male tenant utilized the services of the Boise Metal Works facility located at 11400 West Executive Drive to process DU. EPA and START mobilized to this facility on December 8, 2014 as part of the Treasure Valley Removal Assessment Operation to determine if radioactive contamination was present at the site. Results of the assessment survey identified localized contamination on equipment used to process to material. EPA performed an emergency removal of the contamination at the site. Additional radioactive waste consisting of slag deposited inside the grinding unit and IDW consisting primarily of decon waste was disposed of at the Grand View, Idaho.

Information was also obtained that the male tenant may have performed the same actions which lead to contamination of the Boise Radiation Apartment site at other locations throughout southeast Idaho. EPA and NRC investigators identified an apartment located at 3905 Idaho Avenue, Apartment 103, part of the Eldorado Apartment complex, as the most likely location to

be contaminated. EPA and START personnel mobilized to the site on January 21, 2015 to perform a removal assessment at the property. The exterior and interior of the apartment unit was screened for contamination and results of the survey identified no radioactivity above the site action level.

6.3 Waste Summary

In total, 20 hazardous substance overpacks were packaged for disposal, and 141 bulked containers of radioactive sources, contaminated personal property, and IDW were packaged for disposal. Hazardous substances were disposed of at a disposal facility in Kent, Washington, and the radiological waste was transported to the US Ecology Hazardous Waste and Treatment facility in Grand View, Idaho. The majority of IDW and minimally contaminated items were disposed of at this facility; however, the remaining radioactive sources, low-level waste, liquid mixed waste and NORM were disposed of at US Ecology Richland in Richland, Washington.

6.4 Conclusions

Based on the results of screening surveys performed at the sites associated with the Boise Radiation Apartment and combined Treasure Valley Removal Assessment sites, positive identification of hazardous substances and radioactive materials was obtained in the apartment unit, exterior to the apartment unit, and in two storage sheds accessible to the male tenant. Additionally, positive identification of contamination was obtained at a facility which the male tenant had taken radioactive material to be physically processed by cutting and grinding. No positive identification of radioactive contamination was obtained at the male tenant's former residence.

Upon segregation and removal of the contaminants, no radioactive contamination remains above the site action level at these locations. Hazardous substances and radioactive material were removed from these locations and transported to an appropriate disposal facility. Personal property was screened for radioactive contamination and determined to be free of contamination or was decontaminated to below action levels and returned to their owners.

7. REFERENCES

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Figures

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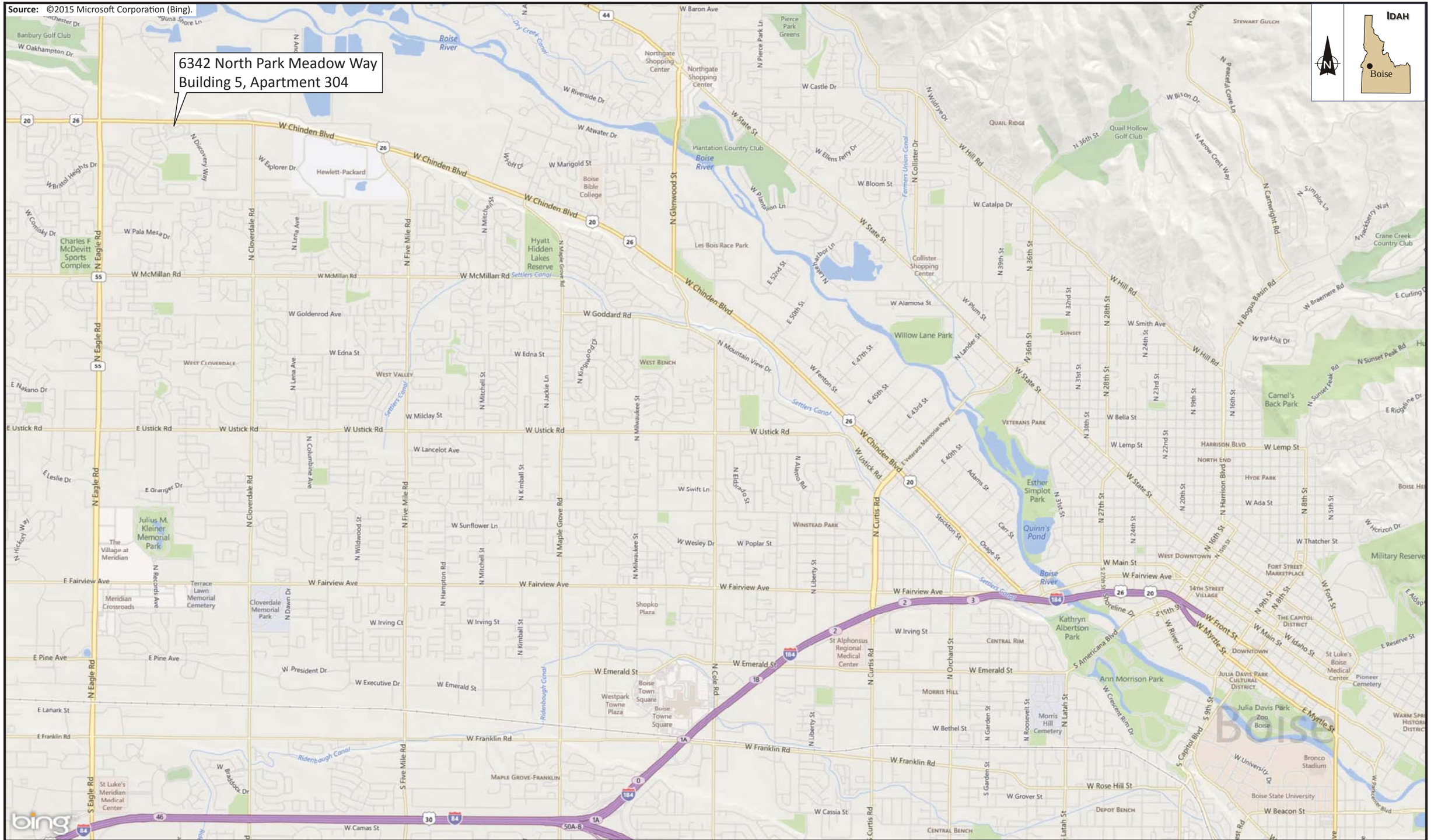
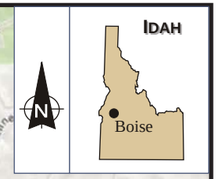


ecology and environment, inc. Global Environmental Specialists Seattle, Washington		BOISE RADIATION APARTMENT RESPONSE 6342 NORTH PARK MEADOW WAY, APARTMENT 304 Boise, Ada County, Idaho	Figure 1-A SITE LOCATION MAP Date: 2/11/15 · Drawn by: AES · 10:START IV\14100005\fig 1-A

Source: ©2015 Microsoft Corporation (Bing).



11345 West Executive Drive

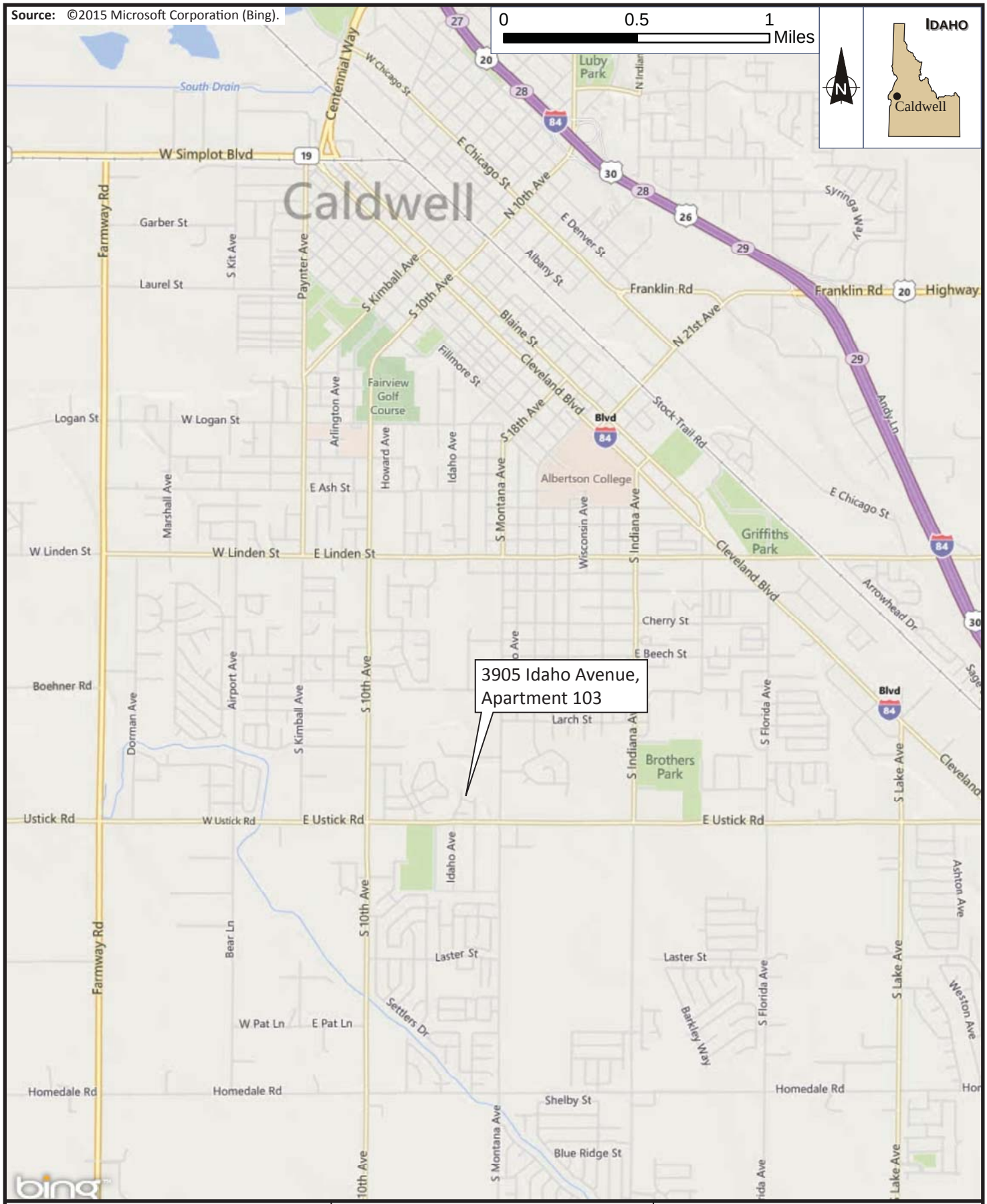
0 0.5 1 Miles

ecology and environment, inc.
Global Environmental Specialists
Seattle, Washington

TREASURE VALLEY RAD REMOVAL SUPPORT - BOISE METAL WORKS
11345 WEST EXECUTIVE DRIVE
Boise, Ada County, Idaho

Figure 1-B
SITE LOCATION MAP

Date:	Drawn by:	
2/11/15	AES	10:START IV_____\fig 1-B



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Global Environmental Specialists
Seattle, Washington

TREASURE VALLEY RAD ASSESSMENT
OPERATION - APARTMENT SURVEY
3905 IDAHO AVENUE, APARTMENT 103
Caldwell, Canyon County, Idaho

Figure 1-C
SITE LOCATION MAP

Date:	Drawn by:	
2/11/15	AES	10:START IV_____\fig 1-C

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Seattle, Washington

BOISE RADIATION APARTMENT RESPONSE
6342 NORTH PARK MEADOW WAY, APARTMENT 304
Boise, Ada County, Idaho

Figure 2-A
SITE MAP

0 125 250
Approximate Scale in Feet

Date:	Drawn by:	
2/11/15	AES	10:START IV\14100005\fig 2-A

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TREASURE VALLEY RAD REMOVAL SUPPORT - BOISE METAL WORKS
11345 WEST EXECUTIVE DRIVE
Boise, Ada County, Idaho

Figure 2-B
SITE MAP

Date:	Drawn by:	
2/11/15	AES	10:START IV_____\fig 2-B

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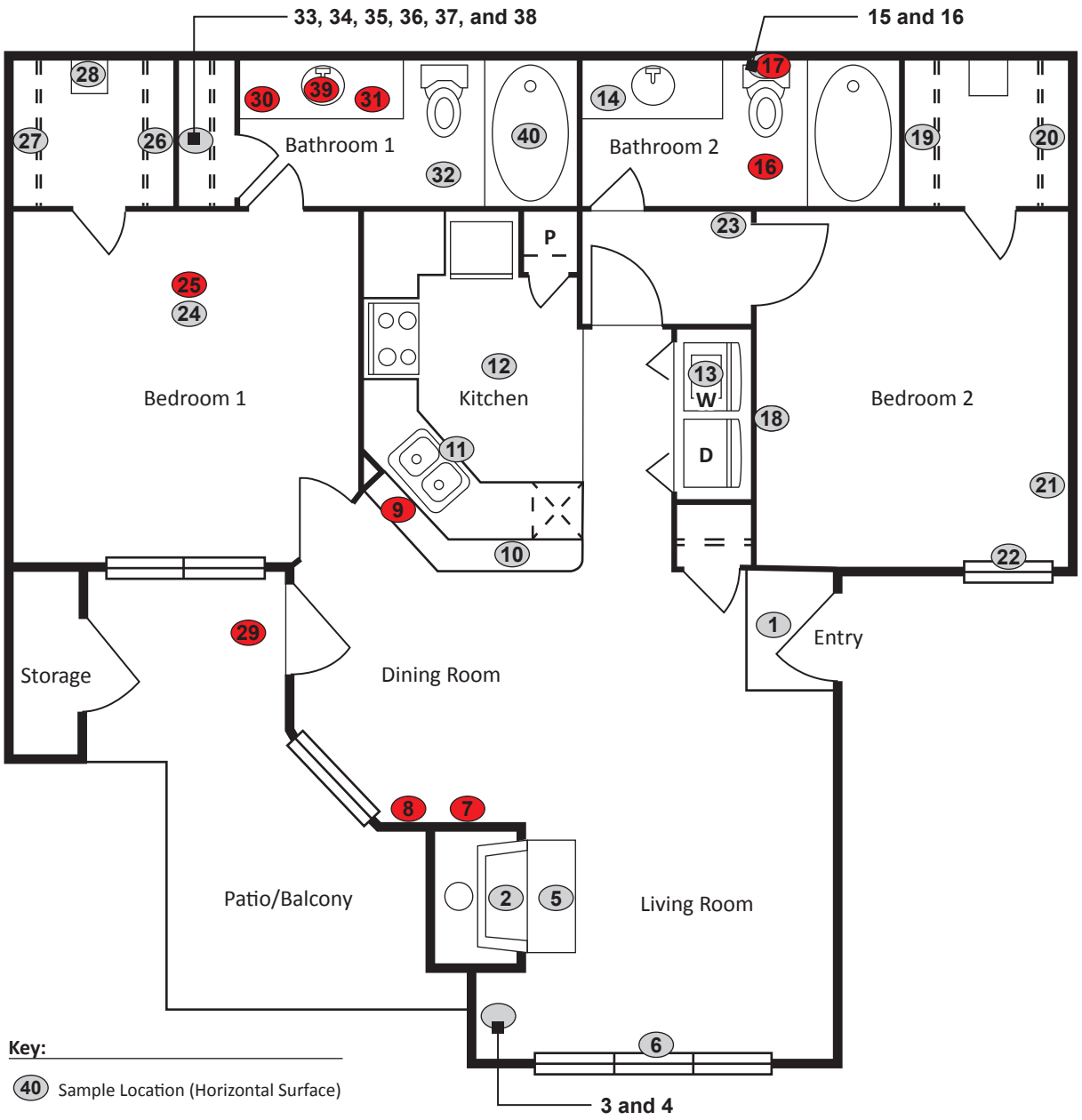
TREASURE VALLEY RAD ASSESSMENT OPERATION - APARTMENT SURVEY
3905 IDAHO AVENUE, APARTMENT 103
Caldwell, Canyon County, Idaho

Figure 2-C
SITE MAP

Date:	Drawn by:	
2/11/15	AES	10:START IV_____\fig 2-C



Note: Red indicates results above the site action limit.

Sample No.	Location ID	Wipe Sample Results (dpm/100 cm²) Alpha	Wipe Sample Results (dpm/100 cm²) Beta	Instrument Direct Scan Results (dpm/100 cm²) Alpha	Instrument Direct Scan Results (dpm/100 cm²) Beta
1	Entry Tile	0.0	154.1	60	7000
2	Fire Place Mantel	0.0	172.2		3000
3	Bookcase Top Shelf	3.4	181.3		2300
4	Bookcase Second Shelf	0.0	187.3		3000
5	Fireplace Floor Tile	6.7	129.9	60	4000
6	Window Seal behind Couch	6.7	169.2		2300
7	Credenza	661.1	232.6		9000
8	Brown Wooden Box with Wires	67.1	1649.5	40	7500
9	Kitchen Bar Counter	97.3	208.5		29000
10	Kitchen Bar Counter	0.0	157.1	0	2800
11	Kitchen Counter by Sink	0.0	163.1	0	2500
12	Kitchen Floor	3.4	148.0	0	2500
13	Washing Machine (inside)	3.4	160.1	0	2400
14	Bathroom 2 - Counter Top	6.7	151.1	0	2400
15	Bathroom 2 - Closet Top Shel	0.0	148.0	0	3400
16	Bathroom 2 - Floor	13.4	154.1		
17	Bathroom 2 - Closet Second Shelf	47.0	374.6	0	2000
18	Bedroom 2 - Night Stand	3.4	166.2	0	2300
19	Bedroom 2 - Small Shelf Closet	0.0	151.1	0	2300
20a	Bedroom 2 - Right Closet	3.4	166.2	0	2300
20b	Bedroom 2 - Right Closet (recount)	3.4	160.1		
21	Bedroom 2 - Square Table	3.4	114.8	0	2300
22	Bedroom 2 - Window Seal	6.7	154.1	0	2300
23	Box of Rocks	0.0	172.2		46000
24	Guitar Case	6.7	154.1		39000
25	Revigorator	83.9	226.6		
26	Closet 1 - Right Bottom Shelf	0.0	187.3	35	2300
27	Closet 1 - Left Shelf	0.0	166.2		
28	Closet 1 - Small Shelf 2 & 3	0.0	142.0	60	2300
29	Outdoor Patio Floor	3332.2	16903.3		
30a	Bathroom 1 - Counter Top	1234.9	6036.3	50	44000
30b	Bathroom 1 - Counter Top (recount)	1375.8	5942.6		
31	Bathroom 1 - Counter Top Right	13.4	211.5	30	14000
32	Bathroom 1 - Floor	6.7	178.2	0	3500
33	Bathroom 1 - Linen Top Shelf	3.4	187.3	-5	4000
34	Bathroom 1 - Linen Second Shelf	0.0	160.1	20	4000
35	Bathroom 1 - Linen Third Shelf	6.7	126.9	20	4000
36	Bathroom 1 - Linen Fourth Shelf	6.7	157.1	20	4000
37	Bathroom 1 - Linen Bottom Shelf	10.1	265.9	110	59000
38	Bathroom 1 - Linen Floor	3.4	163.1		
39	Bathroom 1 - Sink	23.5	244.7		
40a	Bathroom 1 - Tub	3.4	126.9		
40b	Bathroom 1 - Tub (recount)	10.1	123.9		

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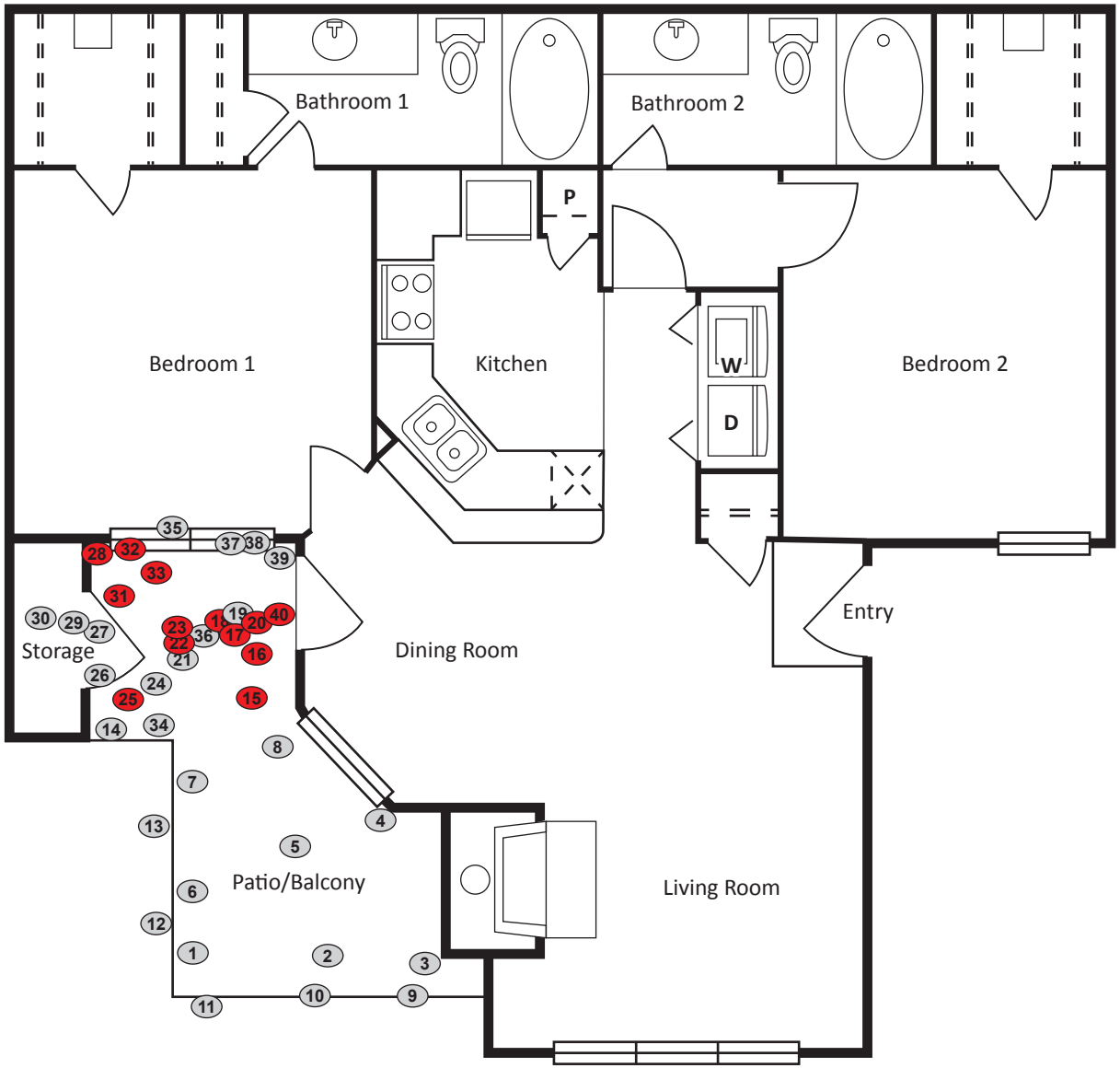
BOISE RADIATION APARTMENT RESPONSE
Boise, Idaho

Figure 3-A
INITIAL SURVEY – OCTOBER 12, 2014
(Tuscany Two Bedroom, Two Bath - 1075 sq. ft.)

Date:	Drawn by:	
3/10/15	AES	10:START IV\14100005\fig 3-A



Key:

40 Sample Location (Horizontal Surface)

Note: Red indicates results above the site action limit.

Sample No.	Location ID	Wipe Sample Results (dpm/100 cm²) Alpha	Wipe Sample Results (dpm/100 cm²) Beta	Instrument Direct Scan Results (cpm) Alpha	Instrument Direct Scan Results (cpm) Beta
1	Concrete Floor	3	41	NR	NR
2	Concrete Floor	0	0	NR	NR
3	Concrete Floor	3	0	NR	NR
4	Concrete Floor	0	0	NR	NR
5	Concrete Floor	3	0	NR	NR
6	Concrete Floor	0	24	NR	NR
7	Concrete Floor	3	0	NR	NR
8	Concrete Floor	0	0	NR	NR
9	Railing	0	5	NR	NR
10	Railing	3	0	NR	NR
11	Railing	0	0	NR	NR
12	Railing	3	11	NR	NR
13	Railing	0	0	NR	NR
14	Railing	6	5	NR	NR
15	Concrete Floor	31	106	NR	60
16	Bulk Material on Concrete Floor	12	77	0	830
17	Concrete Floor	82	339	NR	1200
18	Concrete Floor	133	438	NR	1540
19	Concrete Floor	9	53	NR	0
20	Concrete Floor	25	56	NR	450
21	Concrete Floor	6	45	40	0
22	Stain on Concrete Floor	31	60	300	970
23	Stain on Concrete Floor	92	431	3200	8000
24	Concrete Floor	0	0	0	0
25	Stain on Concrete Floor	12	0	90	800
26	Concrete Floor	9	11	0	0
27	Concrete Floor	0	0	0	0
28	Concrete Floor	12	19	NR	0
29	Concrete Floor	0	0	0	0
30	Garbage Bag	3	16	0	0
31	Concrete Floor	22	74	NR	240
32	Tupperware Container	47	77	700	6660
33	Concrete Floor	NR	NR	650	8000
34	Railing	0	0	NR	NR
35	Window Sill	0	0	NR	NR
36	Concrete Floor	9	24	NR	0
37	Concrete Floor	3	5	NR	NR
38	Concrete Floor	3	19	NR	NR
39	Door Sill	0	11	NR	NR
40	Door Sill	12	24	NR	NR

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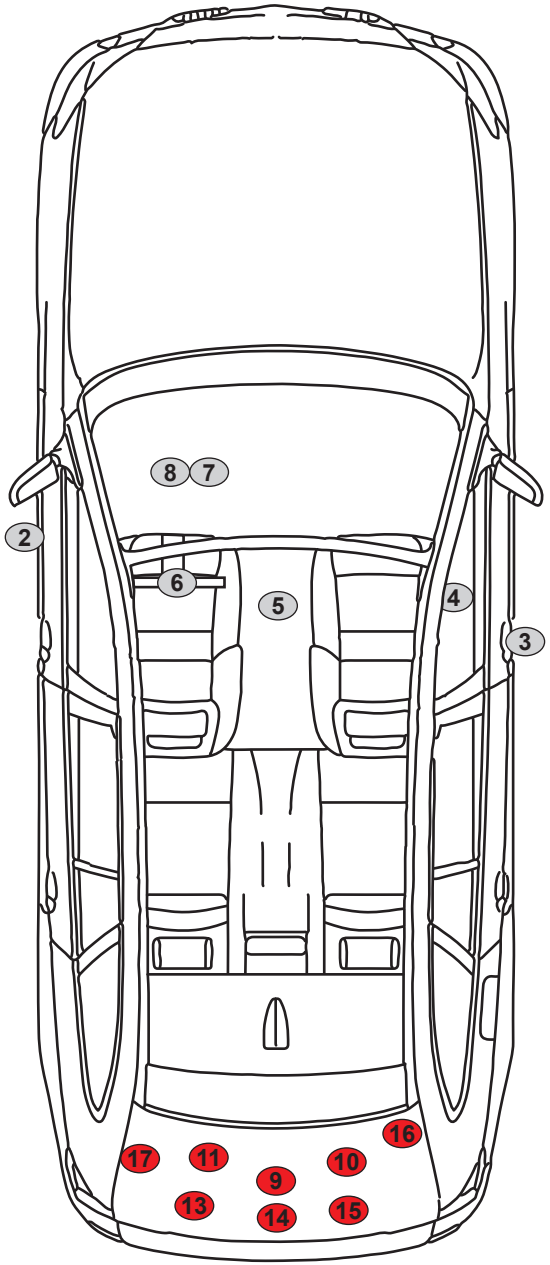
BOISE RADIATION APARTMENT RESPONSE
Boise, Idaho

Figure 3-B
INITIAL SURVEY – OCTOBER 18, 2014

Date:	Drawn by:	
3/10/15	AES	10:START IV\14100005\fig 3-B



Key:

(15) Sample Location

Note: Red indicates results above the site action limit.

10/10/14 Survey

Sample No.	Location ID	Wipe Sample Results (dpm/100 cm^2) Alpha	Wipe Sample Results (dpm/100 cm^2) Beta	Instrument Direct Scan Results (dpm/100 cm2) Alpha	Instrument Direct Scan Results (dpm/100 cm2) Beta
1	Background	0	0	Bkg	Bkg
2	Driver Door	0	15	Bkg	Bkg
3	Passenger Door Handle	0	-18	Bkg	Bkg
4	Inside Passenger Door	0	15	Bkg	Bkg
5	Gear Shift Knob	0	27	Bkg	Bkg
6	Steering Wheel	0	0	Bkg	Bkg
7	Accelerator Pedal	0	-15	Bkg	Bkg
8	Brake Pedal	0	9	Bkg	Bkg
9	Carpet in Trunk Floor	50	88	1985	11667

10/11/14 Survey

Sample No.	Location ID	Instrument Direct Scan Results (dpm/100 cm2) Beta
10	Inside Trunk	9200
11	Inside Trunk	19200
13	Inside Trunk	29200
14	Inside Trunk	19200
15	Inside Trunk	29200
16	Under Trunk Carpet	2200[a]
17	Under Trunk Carpet	2200[a]

[a] Direct scans of entire trunk area at background levels following removal of trunk liner and decon of locations 16 and 17.

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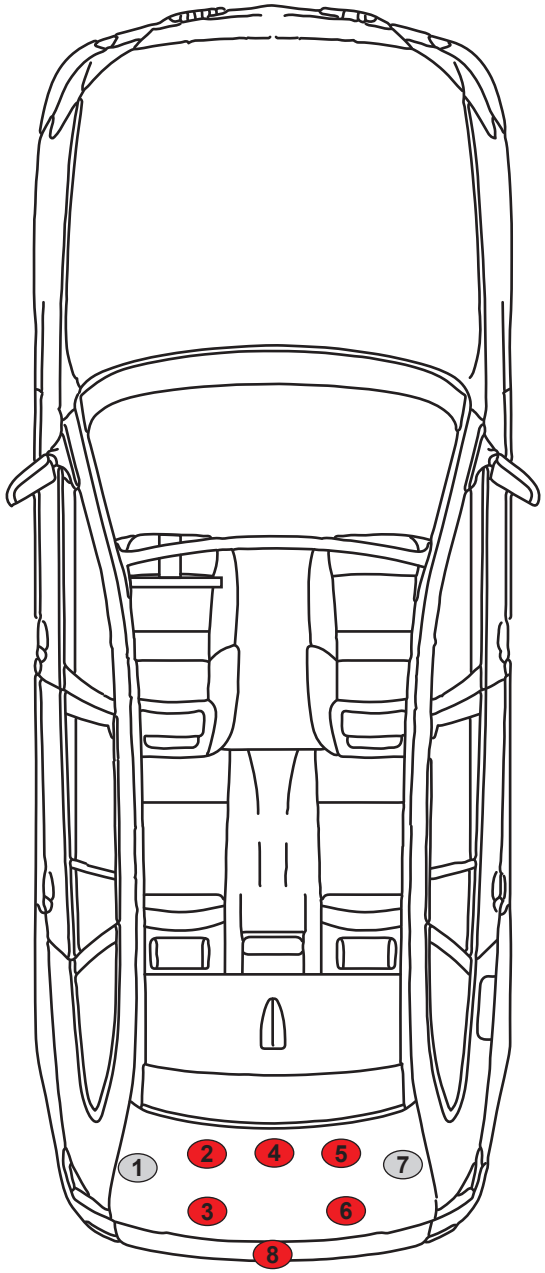
BOISE RADIATION APARTMENT RESPONSE
Boise, Idaho

Figure 3-C
PONTIAC SOLSTICE INITIAL SURVEY – OCTOBER 10 & 11, 2014

Date:	Drawn by:	
3/10/15	AES	10:START IV\14100005\fig 3-C



Key:

(5) Sample Location

Note: Red indicates results above the site action limit.

Sample No.	Location ID	Instrument Direct Scan Results (CPM) Beta
1	Trunk Carpet	80
2	Trunk Carpet	135
3	Trunk Carpet	250
4	Tire Cover	900
5	Trunk Carpet	170
6	Trunk Carpet	180
7	Trunk Carpet	90
8	Bumper	200

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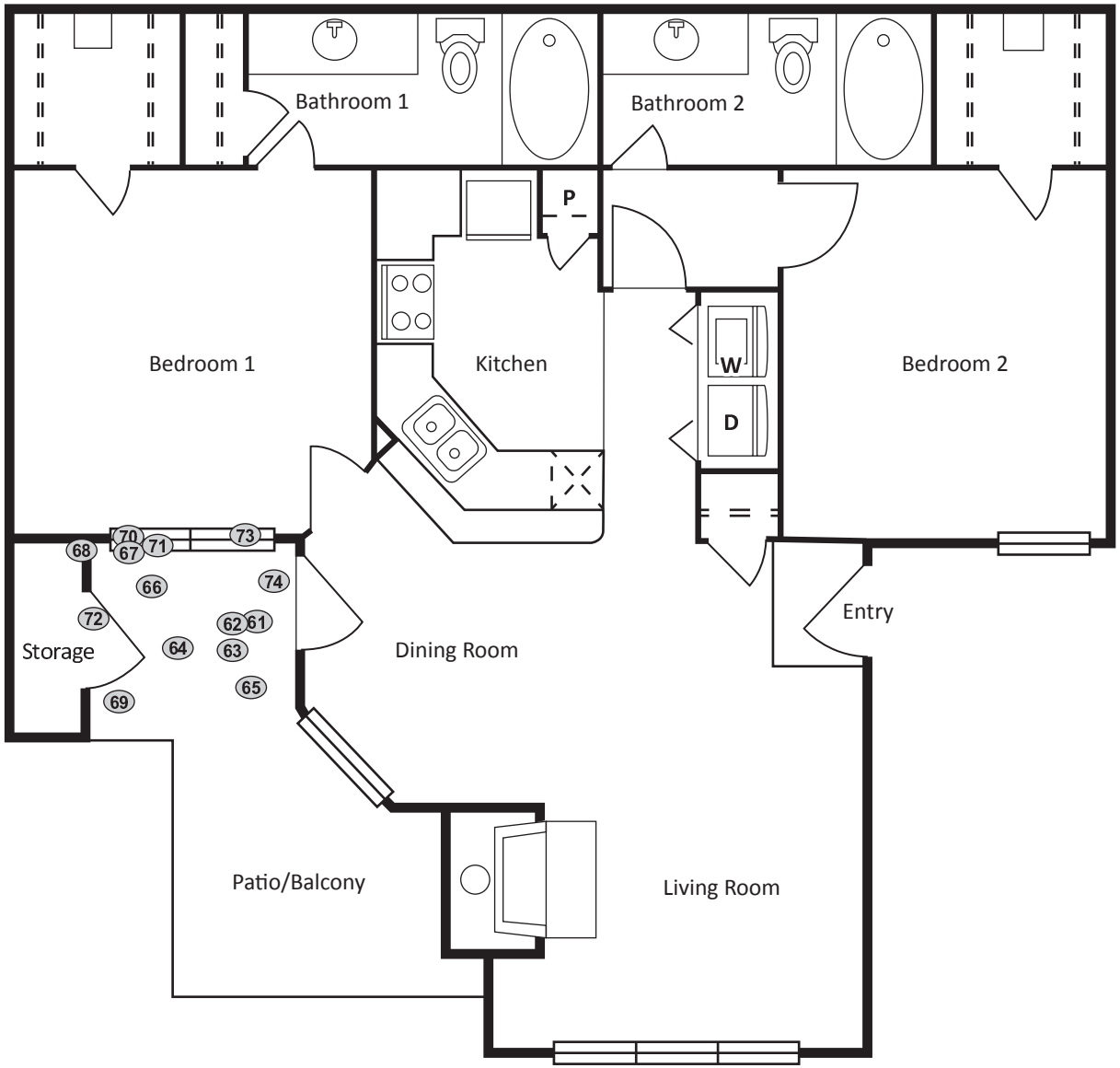
BOISE RADIATION APARTMENT RESPONSE
Boise, Idaho

Figure 3-D
HYUNDAI TIBURON INITIAL SURVEY – OCTOBER 17, 2014

Date:	Drawn by:	
3/10/15	AES	10:START IV\14100005\fig 3-D



Key:

70 Sample Location

Sample No.	Location ID	Wipe Sample Results (dpm/100 cm^2) Alpha	Beta
61	Concrete Floor	0	2
62	Concrete Floor	0	0
63	Concrete Floor	3	0
64	Concrete Floor	3	0
65	Concrete Floor	3	2
66	Concrete Floor	0	0
67	Concrete Floor	0	0
68	Concrete Floor	1	0
69	Concrete Floor	4	0
70	Concrete Floor	3	2
71	Concrete Floor	0	0
72	Concrete Floor	0	0
73	Concrete Floor	0	0
74	Concrete Floor	3	22

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BOISE RADIATION APARTMENT RESPONSE
Boise, Idaho

Figure 4-A
REMOVAL CLEARANCE SURVEY – OCTOBER 20, 2014

Date:	Drawn by:	
3/10/15	AES	10:START IV\14100005\fig 4-A

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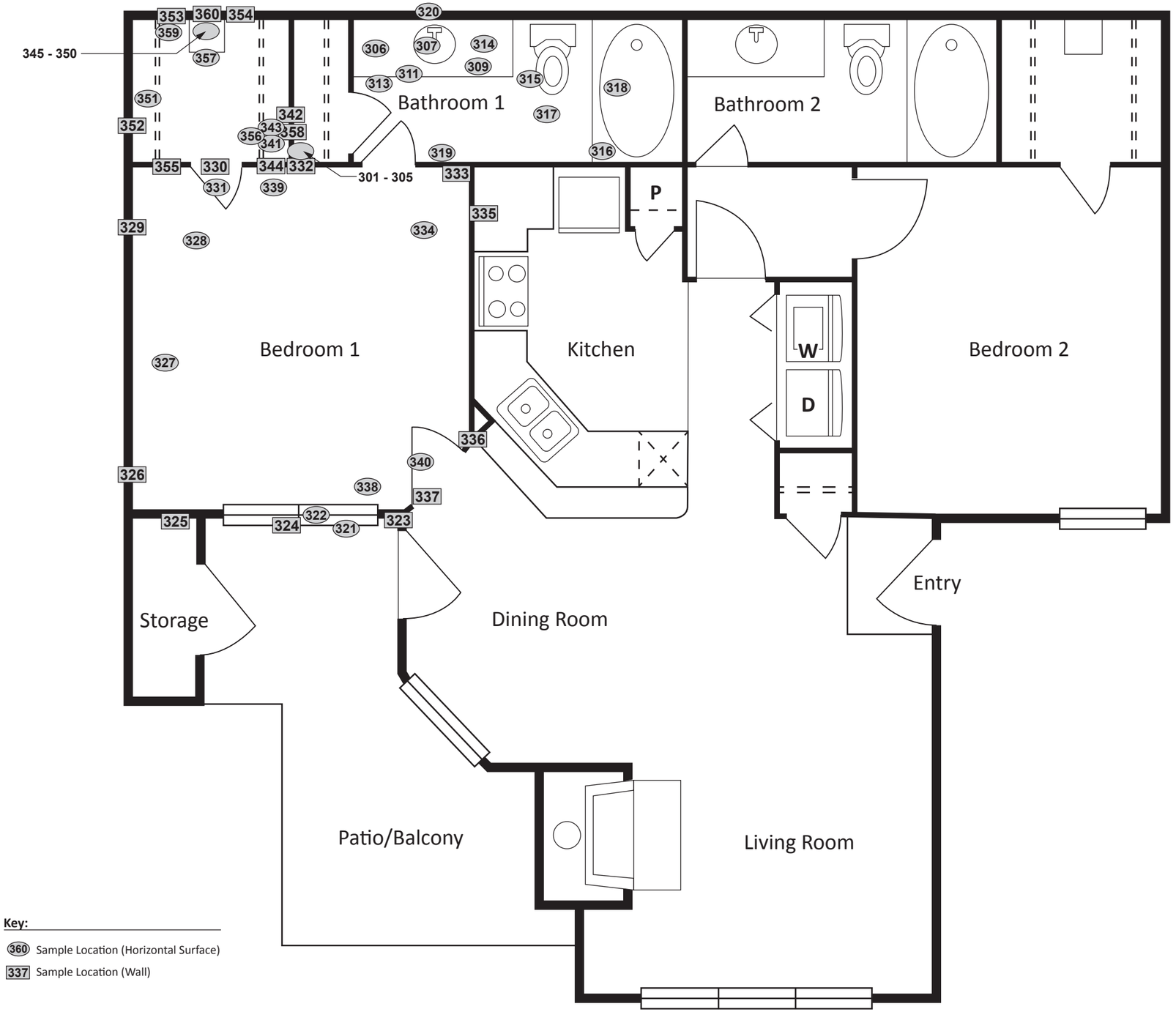

Key:

360 Sample Location (Horizontal Surface)

337 Sample Location (Wall)

Sample No.	Location ID	Wipe Sample Results (dpm/100 cm^2) Alpha	Beta
301	Top Shelf	0	11
302	2nd Shelf from Top	0	0
303	3rd Shelf from Top	3	0
304	4th Shelf from Top	3	0
305	Floor	0	0
306	Counter	0	13
307	Sink	0	0
309	Counter	0	16
311	Cabinet Under Sink	0	16
313	Top Drawer	0	13
314	Under Sink Cabinet	0	0
315	Chair (next to toilet)	0	0
316	Tub	0	0
317	Floor	0	0
318	Tub	0	0
319	Floor	3	0
320	Mirror	0	0
321	Windowsill	0	0
322	Floor	3	22
323	Wall (5')	0	0
324	Wall (above window)	3	16
325	Wall (5.5')	3	0
326	Wall (6')	3	0
327	Floor	3	2
328	Floor	3	30
329	Wall (5.5')	3	5
330	Closet Door (6')	0	0
331	Floor	0	41
332	Wall (2')	0	0
333	Wall (6')	3	3
334	Floor	0	0
335	Wall (1')	0	0
336	Light Switch	0	0
337	Door	6	11
338	Floor	0	0
339	Floor	0	0
340	Floor	0	0
341	Floor	3	5
342	Wall (5')	0	2
343	Top Shelf	0	2
344	Closet Door (5.5')	0	0
345	Top of Bookcase	0	5
346	Top Shelf	3	0
347	2nd Shelf from Top	3	5
348	3rd Shelf from Top	0	0
349	4th Shelf from Top	3	13
350	Bottom Shelf	0	0
351	Top Shelf	0	0
352	Wall (5.5')	0	0
353	Wall (5.5')	0	0
354	Wall (3')	0	24
355	Closet Wall (5.5')	0	0
356	Floor	3	11
357	Floor	0	2
358	Wall (2')	3	41
359	Floor	0	0
360	Wall (5.5')	0	30

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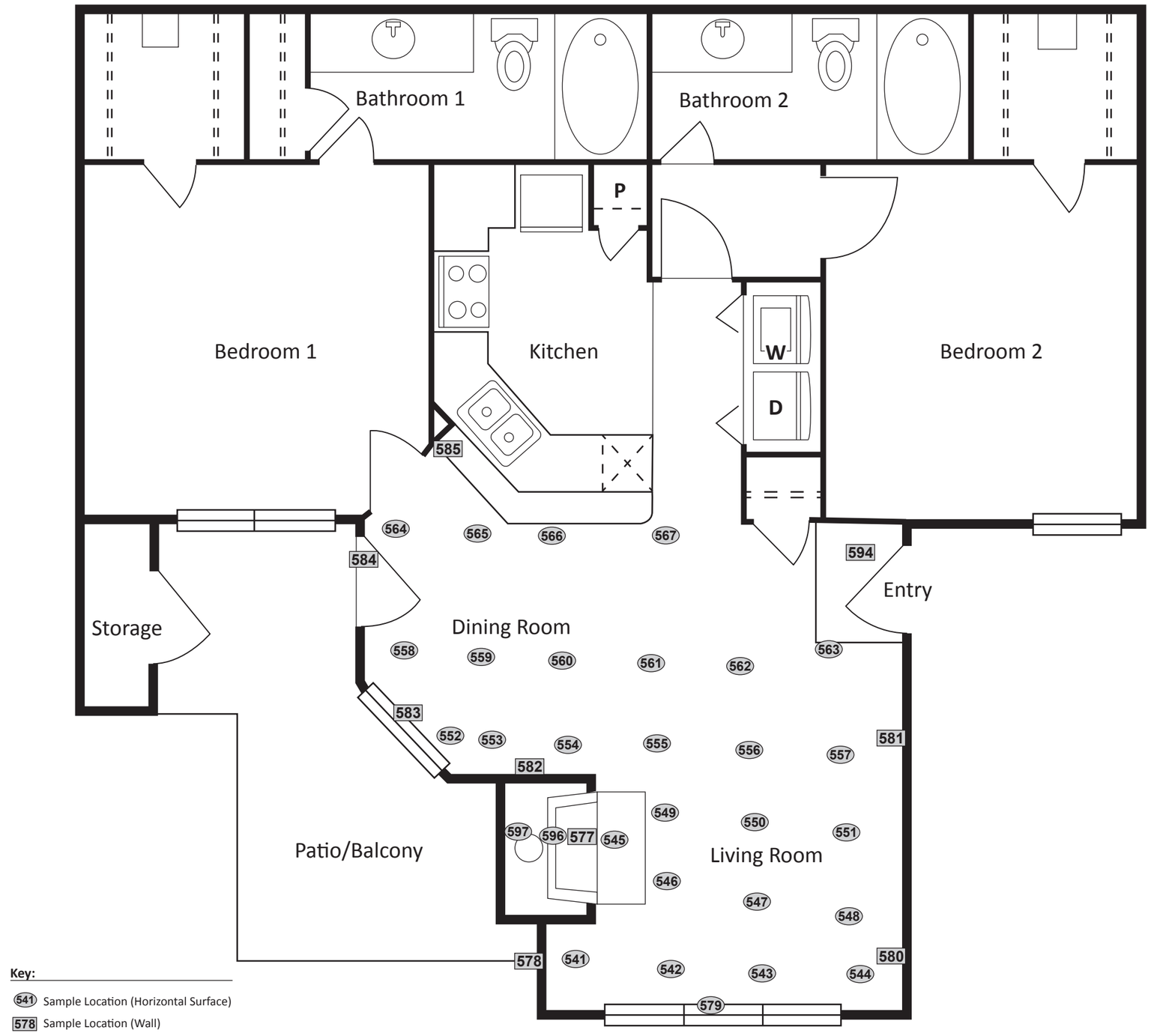
BOISE RADIATION APARTMENT RESPONSE
Boise, Idaho

Figure 4-B
REMOVAL CLEARANCE SURVEY – OCTOBER 22 2014

Date:	Drawn by:	
4/23/15	AES	10:START IV\14100005\fig 4-B



Sample No.	Location ID	Wipe Sample Results (dpm/100 cm²) Alpha	Beta
541	Floorboard	0	0
542	Floorboard	0	0
543	Floorboard	3	0
544	Floorboard	3	38
545	Floorboard	0	0
546	Floorboard	3	8
547	Floorboard	3	0
548	Floorboard	0	0
549	Floorboard	0	13
550	Floorboard	0	0
551	Floorboard	0	0
552	Floorboard/Window Sill	0	0
553	Floorboard	0	0
554	Floorboard	0	22
555	Floorboard	0	0
556	Floorboard	0	0
557	Floorboard	0	11
558	Floorboard	0	5
559	Floorboard	3	2
560	Floorboard	0	0
561	Floorboard	0	0
562	Floorboard	0	0
563	Floorboard	0	0
564	Floorboard	3	0
565	Floorboard	1	0
566	Floorboard	0	0
567	Floorboard	0	8
577	Wall	3	0
578	Wall	0	0
579	Window Sill	0	0
580	Wall	0	0
581	Wall	3	0
582	Wall	3	0
583	Window	0	0
584	Door	3	2
585	Wall	3	0
594	Door	3	16
596	Fireplace	0	0
597	Flue	0	0

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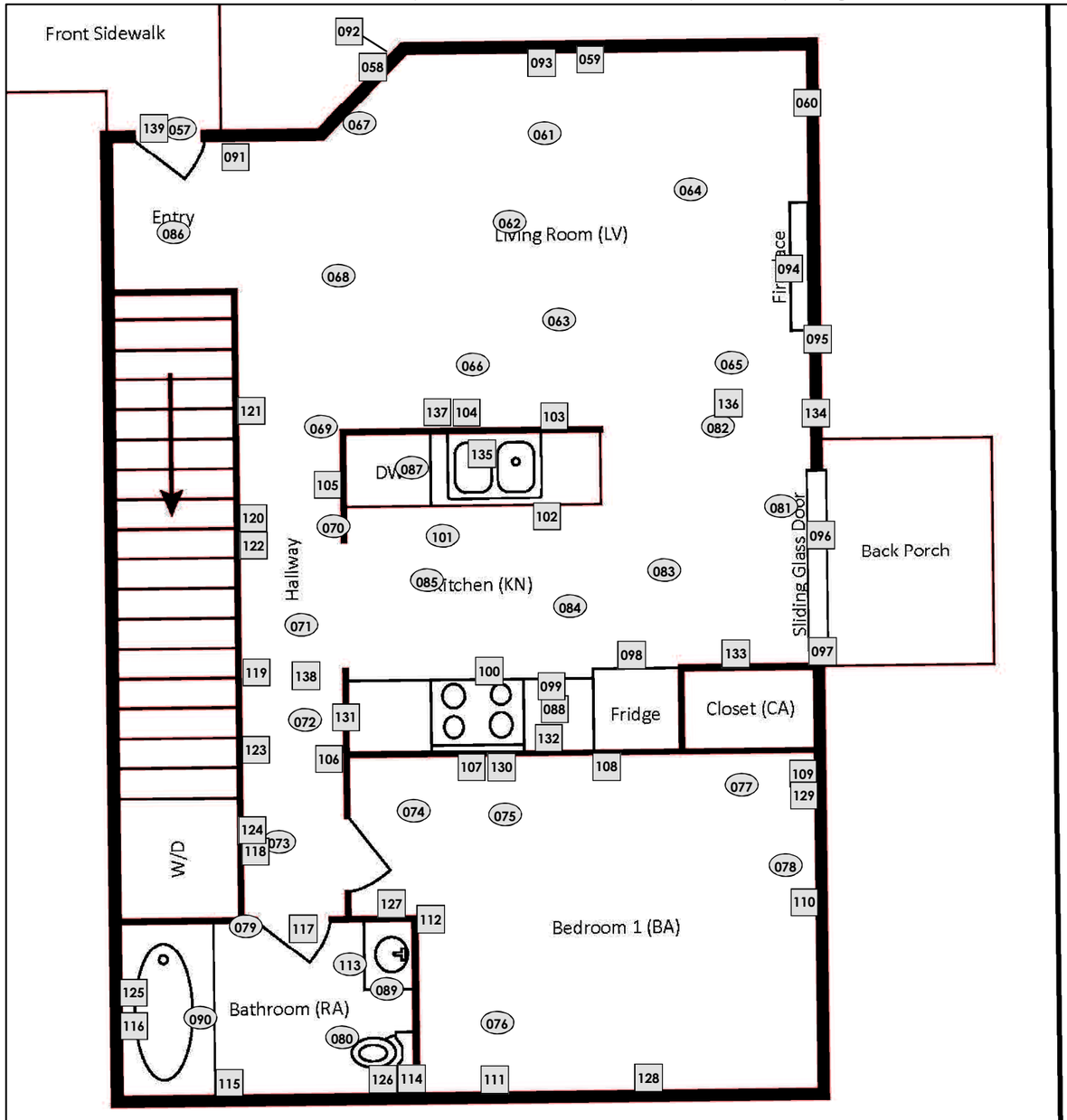
BOISE RADIATION APARTMENT RESPONSE
Boise, Idaho

Figure 4-C
REMOVAL CLEARANCE SURVEY – OCTOBER 26, 2014

Date:	Drawn by:	
3/2/15	AES	10:START IV\14100005\fig 4-C



Swipe Number	Location	Wipe Sample Results (dpm/100 cm²) Alpha	Beta	Swipe Number	Location	Wipe Sample Results (dpm/100 cm²) Alpha	Beta
57	Entry Door Molding (top)	9	0	99	Kitchen Cabinet (2')	3	16
58	Living Room Wall (top)	0	37	100	Kitchen Stove (2')	0	8
59	Living Room Wall (top)	0	41	101	Kitchen Dishwasher (1')	6	0
60	Living Room Wall (top)	0	8	102	Kitchen Cabinet (2')	3	24
61	Living Room Carpet	6	0	103	Living Room Wall (3')	0	0
62	Living Room Carpet	0	41	104	Living Room Wall (3')	0	0
63	Living Room Carpet	0	16	105	Hallway Wall (1')	0	0
64	Living Room Carpet	0	0	106	Hallway Wall (2')	0	4
65	Living Room Carpet	3	53	107	Bedroom Wall (3')	0	20
66	Living Room Carpet	0	20	108	Bedroom Wall (1')	3	20
67	Living Room Carpet	0	12	109	Bedroom Wall (2')	3	0
68	Hallway Carpet	0	28	110	Bedroom Wall (2')	0	16
69	Hallway Carpet	3	0	111	Bedroom Wall (3')	0	0
70	Hallway Carpet	3	0	112	Bedroom Wall (2')	1	12
71	Hallway Carpet	0	0	113	Bathroom Cabinet (2')	0	30
72	Hallway Carpet	0	3	114	Bathroom Wall (3')	0	0
73	Hallway Carpet (stain)	3	0	115	Bathroom Wall (1')	0	37
74	Bedroom Carpet	0	37	116	Bathroom Tub Liner (2')	0	41
75	Bedroom Carpet	3	4	117	Bathroom Door (3')	6	0
76	Bedroom Carpet	0	28	118	Hallway Door (1')	0	0
77	Bedroom Carpet	0	0	119	Hallway Wall (3')	0	0
78	Bedroom Carpet	3	20	120	Hallway Wall (2')	0	16
79	Bathroom Linoleum	0	28	121	Hallway Wall (1')	0	33
80	Bathroom Linoleum	0	33	122	Hallway Wall (6')	3	20
81	Kitchen Linoleum	0	0	123	Hallway Wall (8')	0	0
82	Kitchen Linoleum	0	2	124	Hallway Vent (9')	0	0
83	Kitchen Linoleum	1	6	125	Bathroom Wall (7')	0	33
84	Kitchen Linoleum	9	41	126	Bathroom Wall (8')	0	28
85	Kitchen Linoleum	3	8	127	Bedroom Wall (7')	0	12
86	Landing Linoleum	6	61	128	Bedroom Wall (4')	0	0
87	Kitchen Formica	0	0	129	Bedroom Wall (6')	0	0
88	Kitchen Formica	0	0	130	Bedroom Wall (5')	3	16
89	Bathroom Formica	0	28	131	Hallway Wall (6')	9	16
90	Bathroom Tub Rim	9	24	132	Kitchen Cabinet (6')	0	16
91	Hallway Wall (2')	0	35	133	Kitchen Wall (5')	0	33
92	Living Room Wall (1')	0	0	134	Living Room Wall (8')	0	4
93	Living Room Wall (2')	9	28	135	Kitchen Wall (8')	6	0
94	Living Room Fireplace Tile (3')	0	0	136	Living Room Wall (10')	0	24
95	Living Room Wall (1')	6	0	137	Living Room Wall (10')	6	24
96	Kitchen Patio Door (2')	6	8	138	Hallway Wall (10')	3	0
97	Kitchen Wall (3')	0	16	139	Entry Wall (10')	0	41
98	Kitchen Fridge (1')	0	45				

(#) Sample Location (Horizontal Surfaces)

[#] Sample Location (Wall)

All values reported in dpm/100 cm2

Figure 5-A
Apartment Swipe Test (1st Floor)
Treasure Valley Rad Assessment Operation
3905 Idaho Ave # 103
Caldwell Ada County, Idaho

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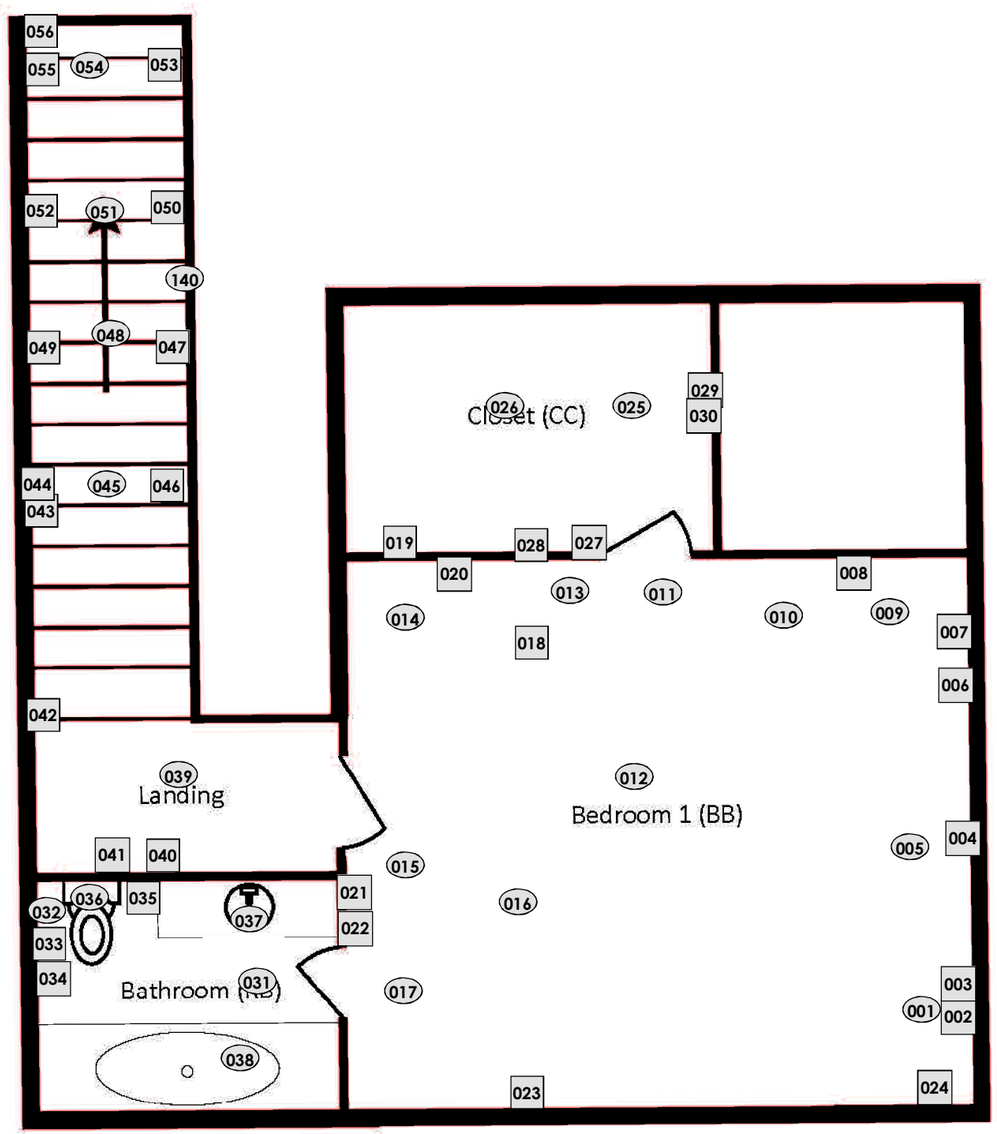

Swipe Number	Location	Wipe Sample Results (dpm/100 cm^2) Alpha	Beta	Swipe Number	Location	Wipe Sample Results (dpm/100 cm^2) Alpha	Beta
1	Bedroom Carpet	0	24	30	Closet Auxillary Door Molding (top)	0	0
2	Bedroom Wall (bottom)	0	20	31	Bathroom Linoleum	3	0
3	Bedroom Wall (top)	0	0	32	Bathroom Linoleum	0	30
4	Bedroom Wall (bottom)	0	0	33	Bathroom Wall (bottom)	0	12
5	Bedroom Carpet	0	70	34	Bathroom Wall (top)	0	12
6	Bedroom Wall (bottom)	0	4	35	Bathroom Wall (top)	0	41
7	Bedroom Wall (top)	0	66	36	Bathroom Ceiling Vent	0	12
8	Bedroom Wall (top)	6	8	37	Bathroom Sink	0	0
9	Bedroom Carpet	0	12	38	Bathroom Tub drain	0	49
10	Bedroom Carpet	0	0	39	Landing Carpet	0	0
11	Bedroom Carpet	3	0	40	Landing Wall (bottom)	0	0
12	Bedroom Carpet	3	20	41	Landing Wall (top)	0	16
13	Bedroom Carpet	0	41	42	Landing Wall (bottom)	0	0
14	Bedroom Carpet	3	0	43	Stairwell Wall (top)	0	24
15	Bedroom Carpet	0	12	44	Stairwell Wall (bottom)	3	8
16	Bedroom Carpet	0	0	45	Stairwell Carpet	0	20
17	Bedroom Carpet	0	0	46	Stairwell Wall	0	82
18	Closet Wall (bottom)	0	12	47	Stairwell Wall	9	28
19	Closet Wall (bottom)	0	49	48	Stairwell Carpet	3	8
20	Bedroom Wall (top)	0	33	49	Stairwell Wall (bottom)	3	33
21	Bedroom Wall (bottom)	0	20	50	Stairwell Wall	0	0
22	Bedroom Wall (top)	9	0	51	Stairwell Carpet	3	16
23	Bedroom Wall (top)	0	14	52	Stairwell Wall (bottom)	0	8
24	Bedroom Wall (top)	9	0	53	Stairwell Wall	0	37
25	Closet Carpet	0	0	54	Stairwell Carpet	0	4
26	Closet Carpet	4	4	55	Stairwell Wall (bottom)	0	0
27	Closet Wall (bottom)	0	10	56	Stairwell Wall (top)	0	16
28	Closet Wall (top)	0	0	140	Stairwell Railing	0	0
29	Closet Auxillary Door Sill	0	6				

(#) Sample Location (Horizontal Surfaces)

[#] Sample Location (Wall)

All values reported in dpm/100 cm2

Figure 5-B
Apartment Swipe Test (2nd Floor)
Treasure Valley Rad Assessment Operation
3905 Idaho Ave # 103
Caldwell Ada County, Idaho

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Attachment A Photographic Documentation

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BOISE RADIATION APARTMENT RESPONSE
Boise, Idaho

TDD Number: 14-10-0005
Photographed by: Chris Whitehead (CW), Brad Martin (BM), Mark Zawistoski (MZ), Eric Nuchims (EN), Michael Worden (MW), Alan Jensen (AJ), EPA, IDEQ, DOE, NRC

Photo 1 Entrance to the Renaissance Apartments complex containing the site.

Direction: *East* *Date: 10/14/14* *Time: 10:25* *Taken by: IDEQ*

Photo 2 Building 5 of the Renaissance Apartment Complex; the site is located on the third floor of this structure.

Direction: *North* *Date: 10/11/14* *Time: 07:18* *Taken by: CW*

Photo 3 Entrance to Apartment # 304; this unit is the Boise Radiation Apartment.

Direction: *East* *Date: 10/11/14* *Time: 09:22* *Taken by: IDEQ*

Photo 4 START performing initial assessment of radiological materials in the apartment.

Direction: *Southeast* *Date: 10/14/14* *Time: 13:44* *Taken by: BM*

Photo 5 TENORM and hazardous substances in a bathroom as found during the initial assessment.

Direction: *South* *Date: 10/12/14* *Time: 15:13* *Taken by: DOE*

Photo 6 A sample of depleted uranium identified in a bathroom at the site; the sample was found with no security or shielding.

Direction: *Down* *Date: 10/12/14* *Time: 15:16* *Taken by: DOE*

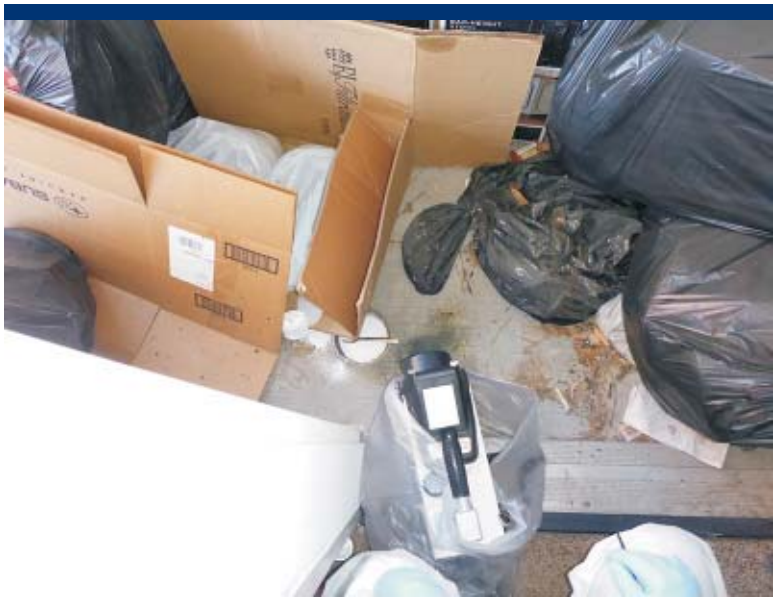

Photo 7 Assessment of spilled material on the partially enclosed porch; the assessment identified the material as uranium.

Direction: *Down* *Date: 10/12/14* *Time: 14:58* *Taken by: DOE*

Photo 8 Solid waste and debris on the partially enclosed porch as found during the intial assessment.

Direction: *East* *Date: 10/14/14* *Time: 13:30* *Taken by: BM*

Photo 9 Consolidated radiological materials and hazardous substances after completion of the initial assessment.

Direction: North Date: 10/14/14 Time: 14:44 Taken by: BM

Photo 10 Clearance Survey of Garage #16 performed by DOE RAP.

Direction: North Date: 10/11/14 Time: 11:46 Taken by: CW

Photo 11 Clearance Survey of Garage #14 performed by DOE RAP.

Direction: North Date: 10/11/14 Time: 13:09 Taken by: CW

Photo 12 Vehicle owned by the RP surveyed by DOE RAP.

Direction: Southwest Date: 10/11/14 Time: 07:18 Taken by: CW

Photo 13 Survey of the vehicle owned by the RP performed by DOE RAP.

Direction: *Down* *Date: 10/11/14* *Time: 08:21* *Taken by: CW*

Photo 14 Contaminated carpet being removed from the trunk of the vehicle owned by the RP.

Direction: *Down* *Date: 10/11/14* *Time: 08:38* *Taken by: CW*

Photo 15 View of consolidated contamination identified on the metal frame in the trunk of the vehicle owned by the RP.

Direction: *Down* *Date: 10/11/14* *Time: 11:41* *Taken by: CW*

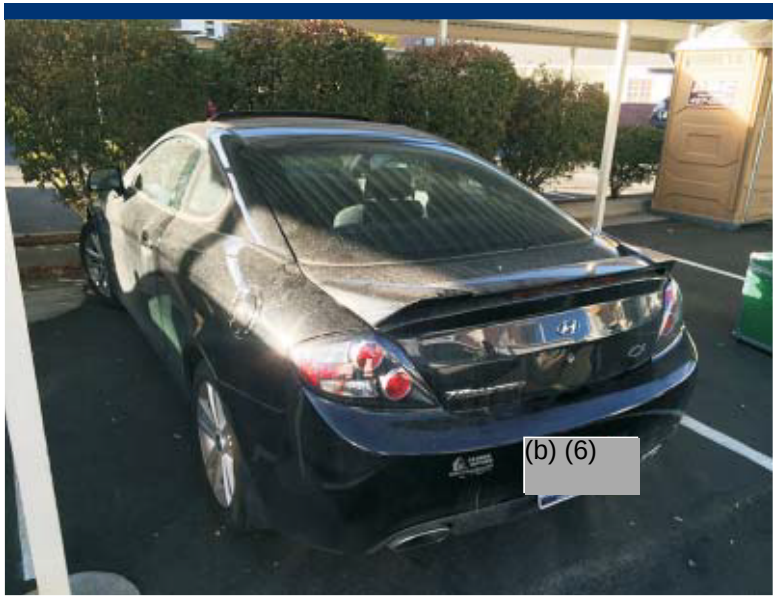

Photo 16 Vehicle owned by a resident of the Boise Radiation Apartment.

Direction: *Southwest* *Date: 10/17/14* *Time: 09:45* *Taken by: EPA*

Photo 17 Screening of contaminated carpeting found in the trunk of the vehicle owned by the resident.

Direction: *Southwest* *Date: 10/17/14* *Time: 09:39* *Taken by: CW*

Photo 18 View of items in the trunk of the vehicle owned by the resident; some of these items were identified as contaminated.

Direction: *Down* *Date: 10/17/14* *Time: 09:24* *Taken by: CW*

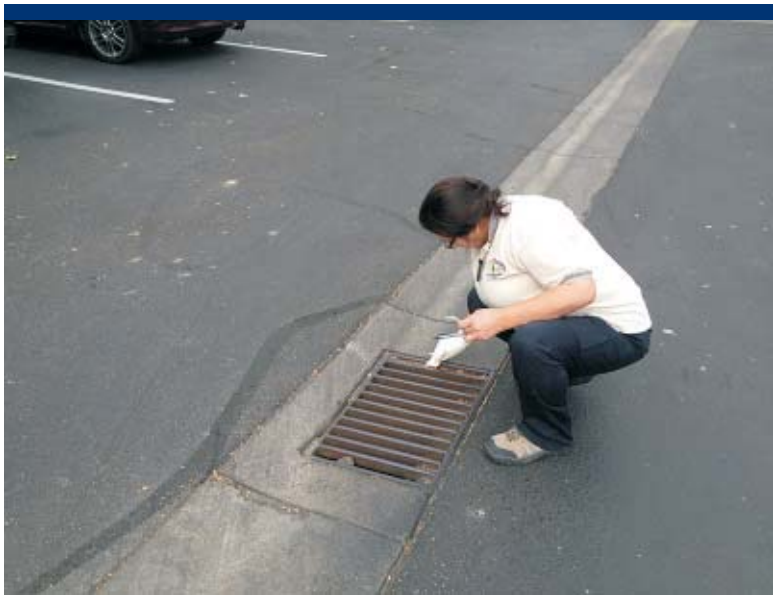

Photo 19 Swipe survey performed by DOE RAP of drains and swales outside the apartment; no contamination was found in this area.

Direction: *Northwest* *Date: 10/11/14* *Time: 13:06* *Taken by: CW*

Photo 20 Screening survey of sidewalks and walkways leading from the apartment; contamination was found in this area .

Direction: *East* *Date: 10/12/14* *Time: 13:37* *Taken by: CW*

Photo 21 ERRS performing removal of the contaminated sidewalk by scabbling the surface and vacuuming dust generated.

Direction: *Northeast* *Date: 10/13/14* *Time: 15:34* *Taken by: IDEQ*

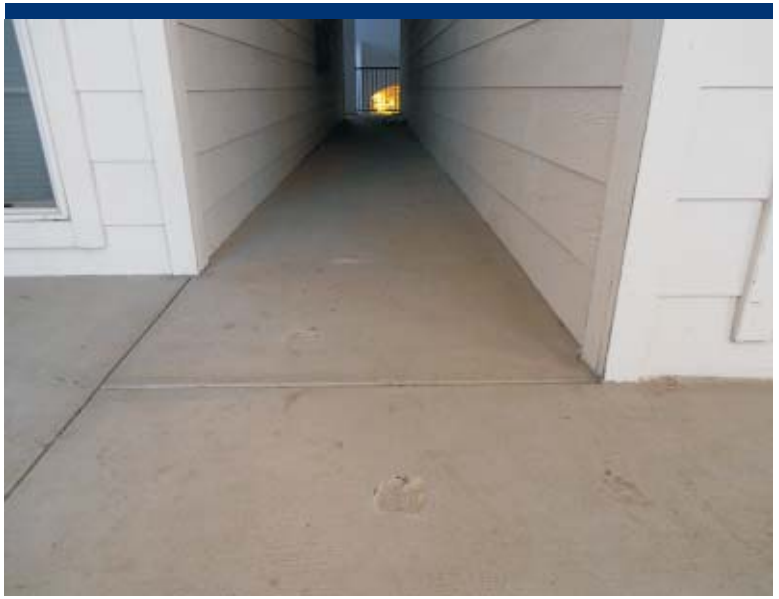

Photo 22 Results of scabbling performed by ERRS along one walkway found to be contaminated.

Direction: *North* *Date: 10/13/14* *Time: 17:57* *Taken by: IDEQ*

Photo 23 Consolidated solid waste from the partially enclosed porch in the apartment.

Direction: *Northeast* *Date: 10/16/14* *Time: 14:16* *Taken by: CW*

Photo 24 START and ERRS performing screening of the solid waste in the garage area.

Direction: *North* *Date: 10/16/14* *Time: 15:51* *Taken by: CW*

Photo 25 START screening the contents of the solid waste from the porch.

Direction: *North* *Date: 10/17/14* *Time: 14:18* *Taken by: CW*

Photo 26 EPA personnel screening personal items for radioactive contamination in the apartment.

Direction: *East* *Date: 10/23/14* *Time: 16:41* *Taken by: MZ*

Photo 27 Area identified as containing radioactive contamination above the site action limit.

Direction: *Down* *Date: 10/21/14* *Time: 12:25* *Taken by: MZ*

Photo 28 EPA personnel performing a swipe survey for clearance of the apartment interior

Direction: *Down* *Date: 10/23/14* *Time: 15:42* *Taken by: MZ*

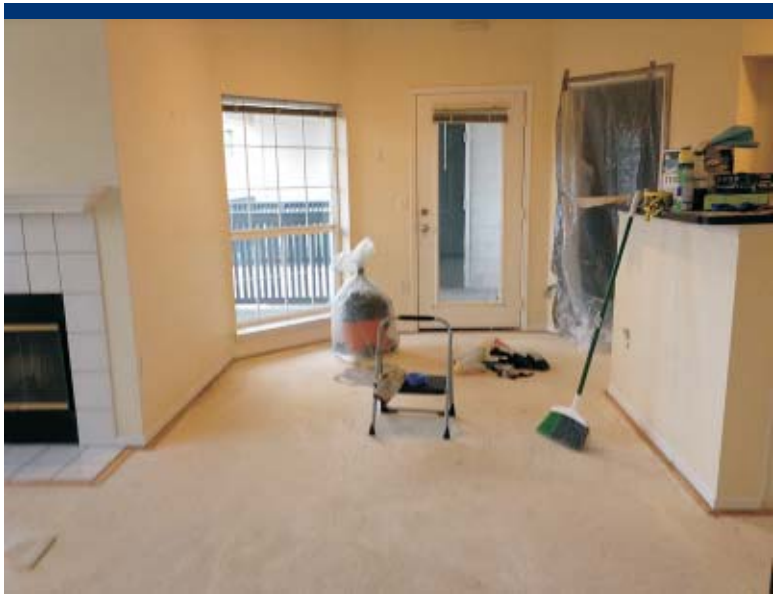

Photo 29 Apartment interior after completion of the clearance survey; carpeting has been removed due to contamination.

Direction: *East* *Date: 10/26/14* *Time: 09:13* *Taken by: CW*

Photo 30 View of the scabbling performed on the porch due to several areas of contamination identified.

Direction: *Down* *Date: 10/20/14* *Time: 17:45* *Taken by: EN*

Photo 31 New carpeting being installed by the apartment complex property manager after completion of the clearance survey.

Direction: *South* *Date: 10/28/14* *Time: 17:38* *Taken by: CW*

Photo 32 EPA Level A truck staged outside Garage #14 where hazard categorization testing was performed.

Direction: *East* *Date: 10/16/14* *Time: 09:23* *Taken by: CW*

Photo 33 START preparing for hazard categorization testing in the Level A truck.

Direction: South Date: 10/16/14 Time: 09:24 Taken by: CW

Photo 34 START performing hazard categorization testing of radioactive materials in Garage #14.

Direction: North Date: 10/18/14 Time: 15:07 Taken by: MW

Photo 35 Radiological field laboratory where swipes were analyzed .

Direction: West Date: 10/18/14 Time: 09:12 Taken by: EPA

Photo 36 DOE RAP performing field analysis of the waste stream for isotopes unable to be accepted by the waste facility.

Direction: Down Date: 10/22/14 Time: 16:05 Taken by: CW

Photo 37 Garage #14 as staged with all hazardous substances and radiological wastes generated at the site.

Direction: *North* *Date: 10/25/14* *Time: 10:16* *Taken by: CW*

Photo 38 Hazardous substances in Garage #6 packed for transportation to the disposal facility in Kent, Washington.

Direction: *East* *Date: 10/31/14* *Time: 10:51* *Taken by: CW*

Photo 39 Garage #6 used to store equipment and expendables and temporarily used to store wastes prior to demobilization.

Direction: *North* *Date: 10/24/14* *Time: 11:03* *Taken by: CW*

Photo 40 Garage #6 after START performed a clearance survey confirming no contamination was present upon demobilization.

Direction: *North* *Date: 10/31/14* *Time: 09:54* *Taken by: CW*

Photo 41 Garage #14 after decontaminating one location found to be contaminated prior to demobilization from the site.

Direction: *North* *Date: 10/30/14* *Time: 07:14* *Taken by: CW*

Photo 42 Entrance to Unit B-35 at the Stor-It facility on Maple Grove Road in Boise, Idaho.

Direction: *North* *Date: 10/11/14* *Time: 16:01* *Taken by: MW*

Photo 43 DOE Rap performing screening of unit B-35 at the Stor-It facility on Maple Grove Road.

Direction: *North* *Date: 10/11/14* *Time: 16:23* *Taken by: MW*

Photo 44 Piece of depleted uranium located weeks after DOE RAP had cleared unit B-35 of radioactive materials.

Direction: *Down* *Date: 10/28/14* *Time: 09:27* *Taken by: CW*

Photo 45 START performing screening of Unit MR-12 at the Stor-It facility on Mitchell Road in Boise, Idaho.

Direction: *South* *Date: 10/29/14* *Time: 17:34* *Taken by: CW*

Photo 46 Items found to be contaminated during initial assessment of unit MR-12.

Direction: *Southwest* *Date: 10/28/14* *Time: 10:39* *Taken by: CW*

Photo 47 Radiological field laboratory where swipes were analyzed in unit MR-15.

Direction: *Southeast* *Date: 10/29/14* *Time: 17:35* *Taken by: CW*

Photo 48 The storage container storing all radioactive waste at the US Ecology facility in Grand View, Idaho.

Direction: *Southeast* *Date: 10/29/14* *Time: 12:36* *Taken by: AJ*

Photo 49 All radioactive wastes as stored in the storage container at the US Ecology facility.

Direction: *Southeast* *Date: 10/29/14* *Time: 12:41* *Taken by: AJ*

Photo 50 Lock and custody tag on the storage container at the US Ecology facility.

Direction: *Southeast* *Date: 1/22/15* *Time: 10:11* *Taken by: CW*

Photo 51 Entrance to the Boise Metal Works facility in Boise, Idaho.

Direction: *Northeast* *Date: 12/8/14* *Time: 15:48* *Taken by: CW*

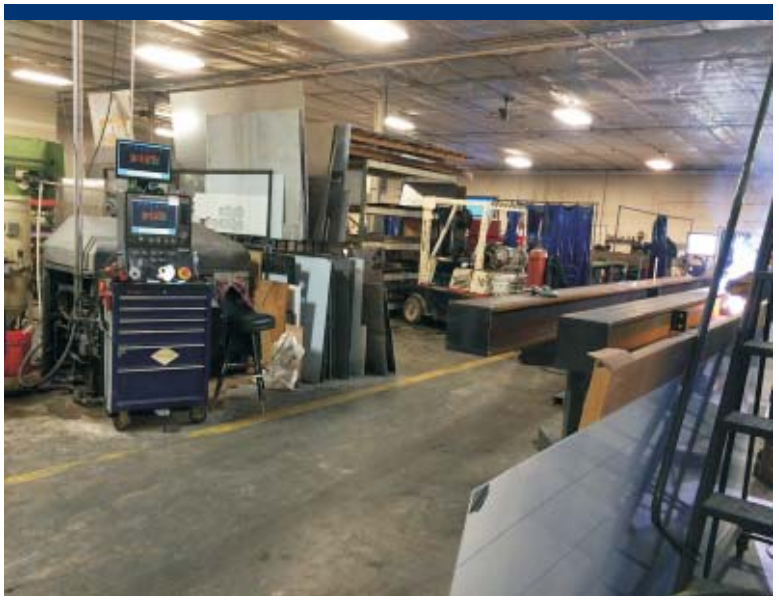

Photo 52 Shoproom floor of the Boise Metal Works facility.

Direction: *Northeast* *Date: 12/5/14* *Time: 14:13* *Taken by: EPA*

Photo 53 START performing screening outside the Boise Metal Works facility.

Direction: *North* *Date: 12/8/14* *Time: 10:29* *Taken by: CW*

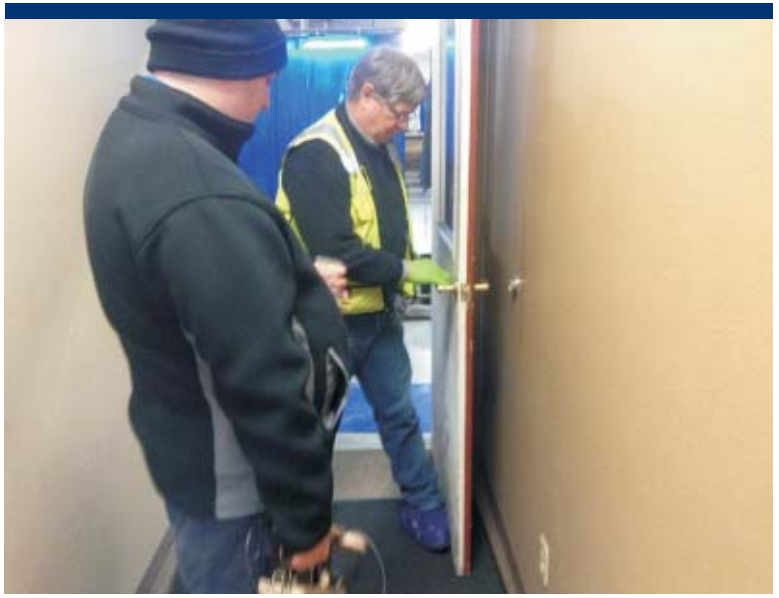

Photo 54 START performing swipe testing inside the Boise Metal Works facility.

Direction: *North* *Date: 12/8/14* *Time: 11:28* *Taken by: EN*

Photo 55 START collecting swipe samples from drainage swales along the Boise Metal Works site boundary.

Direction: *South* *Date: 12/8/14* *Time: 10:41* *Taken by: EN*

Photo 56 Waste metal dumpsters swipe sampled; no contamination was identified.

Direction: *Southwest* *Date: 12/8/14* *Time:* *Taken by: CW*

Photo 57 Vehicle used by the worker performing metal processing at the facility; no contamination was found in the vehicle.

Direction: *West* *Date: 12/8/14* *Time: 12:17* *Taken by: CW*

Photo 58 Grinder unit used to remove oxidation from the uranium sample; note dust bag is connected.

Direction: *Southwest* *Date: 12/3/14* *Time: 13:54* *Taken by: NRC*

Photo 59 Metal dust collected on the inside of the unit around the dust collection bag port.

Direction: *South* *Date: 12/8/14* *Time: 216:41* *Taken by: EN*

Photo 60 Grinder unit after decontaminated by START.

Direction: *Southwest* *Date: 12/9/14* *Time: 11:30* *Taken by: EN*

Photo 61 START sampling the grit catch of a jet cutter used to cut the uranium sample.

Direction: *North* *Date: 12/9/14* *Time: 09:09* *Taken by: CW*

Photo 62 START sampling metal dust from the grinder unit's dust collection bag.

Direction: *Southeast* *Date: 12/9/14* *Time: 14:34* *Taken by: CW*

Photo 63 START screening a former facility where some radioactive metal processing occurred.

Direction: *Down* *Date: 12/9/14* *Time: 15:41* *Taken by: MW*

Photo 64 Apartment formerly occupied by the RP in Caldwell, Idaho.

Direction: *Southeast* *Date: 1/7/15* *Time: 12:40* *Taken by: EPA*

Photo 65 START screening the exterior of the apartment in Caldwell, Idaho.

Direction: *Southeast* *Date: 1/21/15* *Time: 09:26* *Taken by: EN*

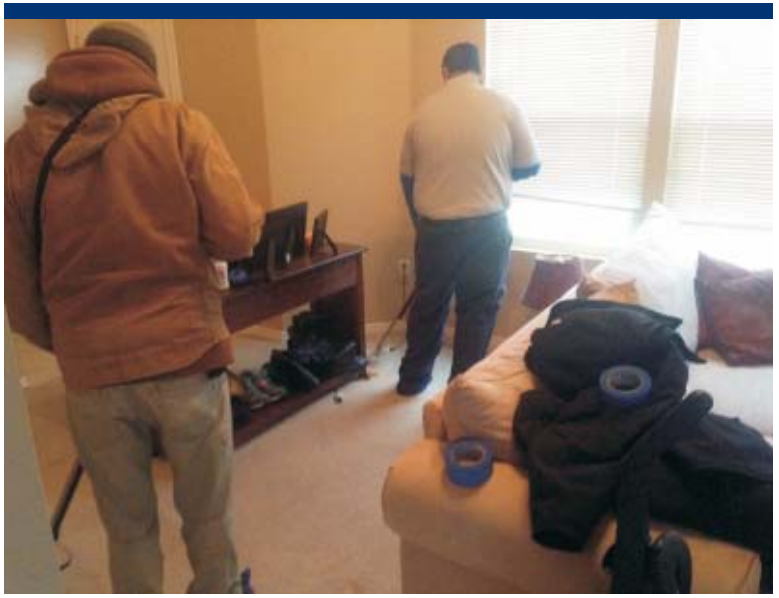

Photo 66 START screening the interior of the apartment in Caldwell, Idaho.

Direction: *North* *Date: 1/21/15* *Time: 10:18* *Taken by: EN*

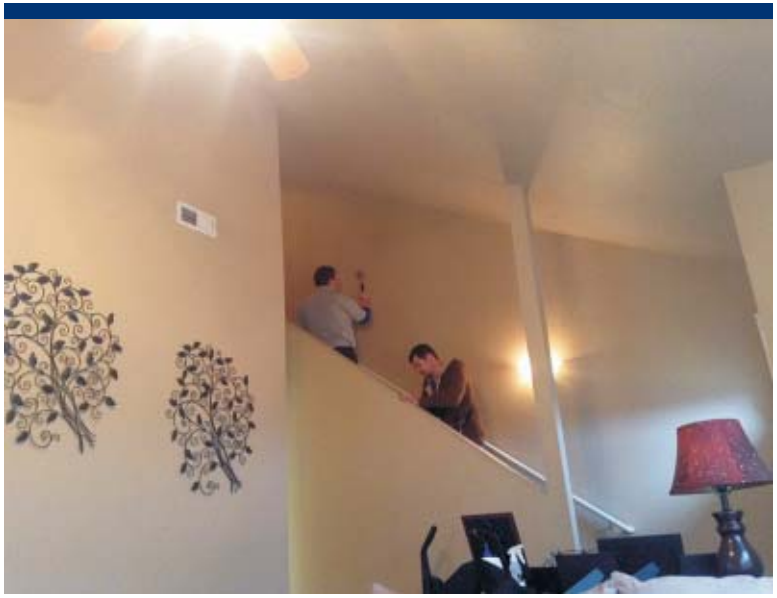

Photo 67 START screening the top floor of the apartment in Caldwell, Idaho.

Direction: *West* *Date: 1/21/15* *Time: 14:27* *Taken by: EN*

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Attachment B Data Validation Memos

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Attachment B-1 Boise Radiation Apartment

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ecology and environment, inc.
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Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 3, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of eight soil samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Isotopic americium analysis (Lab SOP 714) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14100001	14100002	14100003	14100004
14100005	14100006	14100007	14100008

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 13, 2014, and were analyzed by October 26, 2014.

2. **Initial and Continuing Calibration: Acceptable.**

Efficiency, background, and energy results were within QC limits.

3. **Blanks: Acceptable.**

There were no detections in the method blank.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. Duplicate Analysis: Acceptable.

A laboratory duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

7. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

8. Chemical Tracer Analysis: Acceptable.

All chemical tracer results were within the established control limits.

9. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods and laboratory SOPs, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Isotopic Americium By Alpha Spectroscopy Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10ZZ
Client Project Number: 14-10-0005
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1410417

Reported on: Tuesday, October 28, 2014 8:27:23 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyze	Flags
1410417-1	14100001	Sample	Am-241	-0.023 +/- 0.022	0.049	pCi/g	SOIL	AS141021-1	10/25/2014	U
1410417-2	14100002	Sample	Am-241	-0.006 +/- 0.016	0.033	pCi/g	SOIL	AS141021-1	10/25/2014	U
1410417-3	14100003	Sample	Am-241	-0.003 +/- 0.017	0.035	pCi/g	SOIL	AS141021-1	10/25/2014	U
1410417-4	14100004	Sample	Am-241	-0.014 +/- 0.014	0.033	pCi/g	SOIL	AS141021-1	10/25/2014	U
1410417-5	14100005	Sample	Am-241	-0.015 +/- 0.018	0.042	pCi/g	SOIL	AS141021-1	10/25/2014	U
1410417-6	14100006	Sample	Am-241	-0.003 +/- 0.018	0.036	pCi/g	SOIL	AS141021-1	10/26/2014	U
1410417-7	14100007	Sample	Am-241	-0.025 +/- 0.020	0.057	pCi/g	SOIL	AS141021-1	10/26/2014	U,M
1410417-8	14100008	Sample	Am-241	-0.003 +/- 0.016	0.034	pCi/g	SOIL	AS141021-1	10/26/2014	U

Comments:

Data Package ID: *AM1410417-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 3, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of eight soil samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Radium-226 and -228 analyses (Modified EPA method 901.1 and Lab SOP 713) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14100001	14100002	14100003	14100004
14100005	14100006	14100007	14100008

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 13, 2014, and were analyzed by October 19, 2014.

2. **Calibration: Acceptable.**

Applicable calibration results were within QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

6. Duplicate Analysis: Acceptable.

Sample volumes were insufficient to allow preparation of a duplicate; a duplicate analysis of sample 14100001 was performed in lieu of a prepared duplicate. All duplicate results were within QC limits.

7. Laboratory Control Sample (LCS) Analysis: Satisfactory.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits. The sample density was noted as differing by more than +/- 15% from the LCS density; associated sample results were qualified as estimated with a high bias (JH).

8. Efficiency Check: Acceptable.

All efficiency results were within the established control limits.

9. Overall Assessment of Data for Use

Activity concentrations above the calculated MDC are reported in some instances where minimum nuclide identification criteria are not met. Such tentative identifications result when the software attempts to calculate net activity concentrations for analytes where either one or both of the following criteria are not satisfied: the 'diagnostic' peak for a nuclide must be identified above the critical level, or the minimum library peak abundance must be attained. Nuclides not meeting these requirements have been flagged with a "NJ" qualifier indicating tentative identification.

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods and laboratory SOPs, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and `meet quality control criteria. The presence or absence of the analyte cannot be verified.

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100001
Lab ID: 1410417-1
Library: RA226.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 45 minutes
Report Basis: Dry Weight

Final Aliquot: 149 g
Prep Basis: As Received
Moisture(%): 10.463
Result Units: pCi/g
File Name: 141220d01A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	1.29 +/- 0.34 JH	0.61	1	G mw

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100001
Lab ID: 1410417-1
Library: RA228.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 45 minutes
Report Basis: Dry Weight

Final Aliquot: 149 g
Prep Basis: As Received
Moisture(%): 10.463
Result Units: pCi/g
File Name: 141220d01

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	1.18 +/- 0.45 JH	0.88	1	G MW

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100002
Lab ID: 1410417-2
Library: RA226.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 45 minutes
Report Basis: Dry Weight

Final Aliquot: 157 g
Prep Basis: As Received
Moisture(%): 2.836
Result Units: pCi/g
File Name: 141417d03A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	0.84 +/- 0.27 JH	0.56	1	LT,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100002
Lab ID: 1410417-2
Library: RA228.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 45 minutes
Report Basis: Dry Weight

Final Aliquot: 157 g
Prep Basis: As Received
Moisture(%): 2.836
Result Units: pCi/g
File Name: 141417d03

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	0.84 +/- 0.62	0.92	1	U,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100003
Lab ID: 1410417-3
Library: RA226.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 105 g
Prep Basis: As Received
Moisture(%): 11.425
Result Units: pCi/g
File Name: 141184d07A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	0.69 +/- 0.31	0.58	1	LT,G,TI

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID:	14100003
Lab ID:	1410417-3

Library: RA228.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 105 g
Prep Basis: As Received
Moisture(%): 11.425
Result Units: pCi/g
File Name: 141184d07

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	0.74 +/- 0.65	1.01	1	U,M,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100004
Lab ID: 1410417-4
Library: RA226.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 45 minutes
Report Basis: Dry Weight

Final Aliquot: 114 g
Prep Basis: As Received
Moisture(%): 9.535
Result Units: pCi/g
File Name: 141749d04A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	1.16 +/- 0.35 JH	0.75	1	~~G~~ MW

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100004
Lab ID: 1410417-4
Library: RA228.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 45 minutes
Report Basis: Dry Weight

Final Aliquot: 114 g
Prep Basis: As Received
Moisture(%): 9.535
Result Units: pCi/g
File Name: 141749d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	1.13 +/- 0.69 NJH	0.91	1	~~G,TI~~ MW

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100005
Lab ID: 1410417-5
Library: RA226.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 180 minutes
Report Basis: Dry Weight

Final Aliquot: 87.2 g
Prep Basis: As Received
Moisture(%): 27.676
Result Units: pCi/g
File Name: 141222d01A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	1.17 +/- 0.32 JH	0.60	1	G MH

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100005
Lab ID: 1410417-5
Library: RA228.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 180 minutes
Report Basis: Dry Weight

Final Aliquot: 87.2 g
Prep Basis: As Received
Moisture(%): 27.676
Result Units: pCi/g
File Name: 141222d01

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	1.13 +/- 0.45 JH	1.04	1	M3,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100006
Lab ID: 1410417-6
Library: RA226.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 180 minutes
Report Basis: Dry Weight

Final Aliquot: 85.2 g
Prep Basis: As Received
Moisture(%): 28.832
Result Units: pCi/g
File Name: 141419d03A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	1.25 +/- 0.31 JH	0.63	1	G MW

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100006
Lab ID: 1410417-6
Library: RA228.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 180 minutes
Report Basis: Dry Weight

Final Aliquot: 85.2 g
Prep Basis: As Received
Moisture(%): 28.832
Result Units: pCi/g
File Name: 141419d03

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	0.80 +/- 0.45	0.97	1	U,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100007
Lab ID: 1410417-7
Library: RA226.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 180 minutes
Report Basis: Dry Weight

Final Aliquot: 81.3 g
Prep Basis: As Received
Moisture(%): 43.622
Result Units: pCi/g
File Name: 141751d04A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	0.75 +/- 0.42	0.90	1	U,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100007
Lab ID: 1410417-7
Library: RA228.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 180 minutes
Report Basis: Dry Weight

Final Aliquot: 81.3 g
Prep Basis: As Received
Moisture(%): 43.622
Result Units: pCi/g
File Name: 141751d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	0.84 +/- 0.45	0.86	1	U,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100008
Lab ID: 1410417-8
Library: RA226.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 45 minutes
Report Basis: Dry Weight

Final Aliquot: 114 g
Prep Basis: As Received
Moisture(%): 30.217
Result Units: pCi/g
File Name: 141221d01A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	1.13 +/- 0.43 JH	0.84	1	G mw

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410417
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10ZZ 14-10-0005

Field ID: 14100008
Lab ID: 1410417-8
Library: RA228.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 11
Date Collected: 13-Oct-14
Date Prepared: 17-Oct-14
Date Analyzed: 19-Oct-14

Prep Batch: GS141017-1
QCBatchID: GS141017-1-1
Run ID: GS141017-1A
Count Time: 45 minutes
Report Basis: Dry Weight

Final Aliquot: 114 g
Prep Basis: As Received
Moisture(%): 30.217
Result Units: pCi/g
File Name: 141221d01

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	1.18 +/- 0.82	1.13	1	M3,G,TI

NJH

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410417-1*

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: November 13, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of eight soil samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Total uranium analysis (EPA Method 6020A and lab SOP 827) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14100001	14100002	14100003	14100004
14100005	14100006	14100007	14100008

Data Qualifications:

1. Sample Holding Times: Acceptable.

The samples were collected on October 13, 2014, and were analyzed by October 20, 2014, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis.

2. Initial and Continuing Calibration: Acceptable.

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits.

3. Blanks: Acceptable.

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. ICP Interference Check Sample: Acceptable.

An Interference Check Sample (ICS) was analyzed at the beginning of each sequence. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

5. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

7. ICP Serial Dilution: Acceptable.

A batch serial dilution analysis was performed per matrix per concentration or per sample delivery group, whichever was more frequent. All serial dilution results were within QC limits.

8. Matrix Spike (MS)/MS Duplicate (MSD) Analysis: Acceptable.

Batch MS/MSD analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. Spike and spike duplicate recoveries were within the QC limits.

9. Duplicate Analysis: Acceptable.

A laboratory batch duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

10. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

11. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Total URANIUM

Method SW6020 Revision A

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: Ecology and Environment, Inc.
Client Project ID: 10ZZ 14-10-0005
Work Order Number: 1410417
Reporting Basis: Dry Weight
Prep Method: SW3050B
Analyst: Ross Miller

Final Volume: 100 ml
Matrix: SOIL
Result Units: UG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ	Flag	Sample Aliquot
14100001	1410417-1	10/13/2014	10/17/2014	10/20/2014	10.5	10	1700	9.5		1.179 g
14100002	1410417-2	10/13/2014	10/17/2014	10/20/2014	2.8	10	1400	8.5		1.214 g
14100003	1410417-3	10/13/2014	10/17/2014	10/20/2014	11.4	10	750	10		1.099 g
14100004	1410417-4	10/13/2014	10/17/2014	10/20/2014	9.5	10	1500	8.8		1.263 g
14100005	1410417-5	10/13/2014	10/17/2014	10/20/2014	27.7	10	1800	12		1.164 g
14100006	1410417-6	10/13/2014	10/17/2014	10/20/2014	28.8	10	1600	13		1.1 g
14100007	1410417-7	10/13/2014	10/17/2014	10/20/2014	43.6	10	1600	15		1.173 g
14100008	1410417-8	10/13/2014	10/17/2014	10/20/2014	30.2	10	1600	13		1.133 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *im1410417-1*

ecology and environment, inc.
Global Environmental Specialists
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Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 5, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of eight solid samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Isotopic uranium analysis (Lab SOP 714) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14100010	14100011	14100012	14100014	14100016
14100017	14100021	14100024		

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 12, 2014, and were analyzed by November 22, 2014.

2. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

3. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

4. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

5. **Laboratory Control Sample Analysis: Acceptable.**

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were

within the established control limits.

6. Chemical Yield, Background, Energy, and Efficiency Check Results: Acceptable.

All chemical yield, background, energy, and efficiency check results were within the established control limits.

7. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NL
Client Project Number: 14-10-0005-02
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1410833

Reported on: Sunday, November 30, 2014 5:29:02 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	NA	Units	Matrix	Prep Batch	Date Analyzed	Flags
1410833-1	14100010	Sample	U-234	3.8 +/- 2.6	2.6	NA	pCi/g	SOLID	AS141114-1	11/23/2014	M3
1410833-1	14100010	Sample	U-235	1.6 +/- 2.0	3.0	NA	pCi/g	SOLID	AS141114-1	11/23/2014	U,M
1410833-1	14100010	Sample	U-238	12.2 +/- 4.7	3.2	NA	pCi/g	SOLID	AS141114-1	11/23/2014	M3
1410833-2	14100011	Sample	U-234	30600 +/- 5500	500	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-2	14100011	Sample	U-235	4100 +/- 1100	300	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-2	14100011	Sample	U-238	231000 +/- 39000	0	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-3	14100012	Sample	U-234	30700 +/- 5600	300	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-3	14100012	Sample	U-235	3900 +/- 990	90	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-3	14100012	Sample	U-238	209000 +/- 36000	0	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3

Comments:

Data Package ID: *UR1410833-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NL
Client Project Number: 14-10-0005-02
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1410833

Reported on: Sunday, November 30, 2014 5:29:02 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	NA	Units	Matrix	Prep Batch	Date Analyzed	Flags
1410833-4	14100014	Sample	U-234	27500 +/- 5000	300	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-4	14100014	Sample	U-235	4200 +/- 1100	100	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-4	14100014	Sample	U-238	198000 +/- 34000	0	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-5	14100016	Sample	U-234	23000 +/- 4100	200	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-5	14100016	Sample	U-235	3060 +/- 790	80	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-5	14100016	Sample	U-238	165000 +/- 28000	0	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-6	14100017	Sample	U-234	22100 +/- 3900	300	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-6	14100017	Sample	U-235	3010 +/- 780	220	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-6	14100017	Sample	U-238	155000 +/- 26000	0	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3

Comments:

Data Package ID: *UR1410833-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NL
Client Project Number: 14-10-0005-02
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1410833

Reported on: Sunday, November 30, 2014 5:29:02 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	NA	Units	Matrix	Prep Batch	Date Analyzed	Flags
1410833-7	14100021	Sample	U-234	35100 +/- 6200	500	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-7	14100021	Sample	U-235	7100 +/- 1600	400	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-7	14100021	Sample	U-238	264000 +/- 44000	0	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-8	14100024	Sample	U-234	52800 +/- 9400	700	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-8	14100024	Sample	U-235	6200 +/- 1700	400	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3
1410833-8	14100024	Sample	U-238	386000 +/- 65000	0	NA	pCi/g	SOLID	AS141114-1	11/22/2014	M3

Comments:

Data Package ID: *UR1410833-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

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MEMORANDUM

DATE: December 5, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of eight soil samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Radium-226 analyses (Modified EPA method 903.1 and Lab SOPs 736 and 783) were performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14100010	14100011	14100012	14100014	14100016
14100017	14100021	14100024		

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 12, 2014, and were analyzed by November 26, 2014.

2. **Calibration and Efficiency Performance Checks: Acceptable.**

Applicable calibration and efficiency performance check results were within QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

6. Laboratory Control Sample (LCS) Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

7. Chemical Yield: Acceptable.

All chemical yield results were within the established control limits.

9. Overall Assessment of Data for Use

Due to uncertainty associated with the ICP-AES determination of barium concentration in the samples, the calculated yield for sample 14100010 fell between 100% and 110%. To minimize the potential for low bias, results have been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. This sample result is qualified as estimated with a low bias (JL).

The ICP-AES measurement of barium concentrations prior to chemical separation for sample 14100021 showed a concentration less than the amount known to have been added to the sample in the form of barium carrier. To avoid and minimize the potential low bias in the final analytical results for this sample, the known concentration of the carrier was used in the chemical yield calculations in lieu of the pre-separation measurement. This sample has a low bias of 15% or less in the pre-separation measurement and the sample result is qualified as estimated with a low bias (JL). The low bias in the pre-separation ICP measurement may be attributable to matrix interference.

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods and laboratory SOPs, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and `meet quality control criteria. The presence or absence of the analyte cannot be verified.

Ra-226 by Radon Emanation - Method 903.1 Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NL
Client Project Number: 14-10-0005-02
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1410833

Reported on: Sunday, November 30, 2014 5:48:10 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	NA	Units	Matrix	Prep Batch	Date Analyzed	Flags
1410833-1	14100010	Sample	Ra-226	1.6 +/- 1.6	0.9	NA	pCi/g	SOLID	RE141113-1	11/26/2014	~~T~~ JL
1410833-2	14100011	Sample	Ra-226	0.43 +/- 0.46	0.66	NA	pCi/g	SOLID	RE141113-1	11/26/2014	U
1410833-3	14100012	Sample	Ra-226	0.91 +/- 0.53	0.19	NA	pCi/g	SOLID	RE141113-1	11/26/2014	~~LT~~
1410833-4	14100014	Sample	Ra-226	0.91 +/- 0.68	0.92	NA	pCi/g	SOLID	RE141113-1	11/26/2014	U
1410833-5	14100016	Sample	Ra-226	1.19 +/- 0.81	1.05	NA	pCi/g	SOLID	RE141113-1	11/26/2014	~~M3~~
1410833-6	14100017	Sample	Ra-226	0.37 +/- 0.43	0.66	NA	pCi/g	SOLID	RE141113-1	11/26/2014	U
1410833-7	14100021	Sample	Ra-226	0.41 +/- 0.34	0.19	NA	pCi/g	SOLID	RE141113-1	11/26/2014	~~LT~~ JL
1410833-8	14100024	Sample	Ra-226	0.61 +/- 0.50	0.57	NA	pCi/g	SOLID	RE141113-1	11/26/2014	~~LT~~

Comments:

Data Package ID: *RE1410833-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

12-4-14

5207

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MEMORANDUM

DATE: December 3, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of eight soil samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Total uranium analysis (EPA Method 6020A and lab SOP 827) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14100010	14100011	14100012	14100014
14100016	14100017	14100021	14100024

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected between October 12 and 20, 2014, and were analyzed by November 5, 2014, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis.

2. **Initial and Continuing Calibration: Acceptable.**

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **ICP Interference Check Sample: Acceptable.**

An Interference Check Sample (ICS) was analyzed at the beginning of each sequence. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

5. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

7. ICP Serial Dilution: Acceptable.

A batch serial dilution analysis was performed per matrix per concentration or per sample delivery group, whichever was more frequent. All serial dilution results were within QC limits.

8. Matrix Spike (MS)/MS Duplicate (MSD) Analysis: Acceptable.

Batch MS/MSD analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. Spike and spike duplicate recoveries were within the QC limits.

9. Duplicate Analysis: Acceptable.

A laboratory batch duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

10. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

11. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Total URANIUM

Method SW6020 Revision A

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: Ecology and Environment, Inc.
Client Project ID: 10NL 14-10-0005-02
Work Order Number: 1410833
Reporting Basis: As Received
Prep Method: SW3050B
Analyst: Ross Miller

Final Volume: 100 ml
Matrix: SOLID
Result Units: MG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ	Flag	Sample Aliquot
14100010	1410833-1	10/12/2014	11/05/2014	11/05/2014	N/A	100	28	1.4		0.0719 g
14100011	1410833-2	10/12/2014	11/05/2014	11/05/2014	N/A	100000	670000	65		1.5283 g
14100012	1410833-3	10/12/2014	11/05/2014	11/05/2014	N/A	100000	630000	54		1.8381 g
14100014	1410833-4	10/12/2014	11/05/2014	11/05/2014	N/A	100000	610000	230		0.4285 g
14100016	1410833-5	10/12/2014	11/05/2014	11/05/2014	N/A	100000	480000	160		0.6266 g
14100017	1410833-6	10/12/2014	11/05/2014	11/05/2014	N/A	100000	470000	63		1.5898 g
14100021	1410833-7	10/12/2014	11/05/2014	11/05/2014	N/A	100000	810000	65		1.5372 g
14100024	1410833-8	10/20/2014	11/05/2014	11/05/2014	N/A	100000	990000	92		1.0894 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *im1410833-1*

MW 12-3-14

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
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MEMORANDUM

DATE: December 5, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of eight soil samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Radium-228 analyses (Lab SOP 724) were performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14100010	14100011	14100012	14100014	14100016
14100017	14100021	14100024		

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 12, 2014, and were analyzed by November 17, 2014.

2. **Calibration: Acceptable.**

Applicable calibration results were within QC limits.

3. **Blanks: Acceptable.**

There were no detections in any blanks.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. Laboratory Control Sample (LCS) Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

7. Background, Efficiency Check, and Chemical Yield: Acceptable.

All background, efficiency check, and chemical yield results were within the established control limits.

8. Overall Assessment of Data for Use

The ICP-AES measurement of barium concentration prior to chemical separation for sample 14100010 showed concentrations less than the amount known to have been added to the sample in the form of barium carrier. To avoid and minimize the potential low bias in the final analytical results for this sample, the known concentration of the carrier was used in the chemical yield calculations in lieu of the pre-separation measurement. The sample with a low bias of 15% or less in the pre-separation measurement is qualified as an estimated quantity with a low bias (JL). The low bias may be attributable to matrix interference.

Due to uncertainty associated with the ICP-AES determination of barium concentration in the samples, the calculated yield for sample 14100010 fell between 100% and 110%. To minimize the potential for low bias, results have been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. This sample result is qualified as an estimated quantity with a low bias (JL).

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods and laboratory SOPs, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and `meet quality control criteria. The presence or absence of the analyte cannot be verified.

Radium-228 Analysis by GFPC Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NL
Client Project Number: 14-10-0005-02
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1410833

Reported on: Sunday, November 30, 2014 6:08:31 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	NA	Units	Matrix	Prep Batch	Date Analyzed	Flags
1410833-1	14100010	Sample	Ra-228	22.2 +/- 7.6	9.7	NA	pCi/g	SOLID	RA141112-3	11/17/2014	Y1,M3
1410833-2	14100011	Sample	Ra-228	17.5 +/- 4.4	2.1	NA	pCi/g	SOLID	RA141112-3	11/17/2014	
1410833-3	14100012	Sample	Ra-228	22.2 +/- 5.4	2.1	NA	pCi/g	SOLID	RA141112-3	11/17/2014	
1410833-4	14100014	Sample	Ra-228	15.7 +/- 4.0	2.2	NA	pCi/g	SOLID	RA141112-3	11/17/2014	
1410833-5	14100016	Sample	Ra-228	15.0 +/- 3.8	2.2	NA	pCi/g	SOLID	RA141112-3	11/17/2014	
1410833-6	14100017	Sample	Ra-228	19.5 +/- 4.8	2.1	NA	pCi/g	SOLID	RA141112-3	11/17/2014	
1410833-7	14100021	Sample	Ra-228	61 +/- 14	2	NA	pCi/g	SOLID	RA141112-3	11/17/2014	
1410833-8	14100024	Sample	Ra-228	30.8 +/- 7.4	2.5	NA	pCi/g	SOLID	RA141112-3	11/17/2014	

Comments:

Data Package ID: *RA1410833-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 5, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of eight soil samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Gamma Spectroscopy analyses (Lab SOP 713) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14100010	14100011	14100012	14100014	14100016
14100017	14100021	14100024		

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 12 or 20, 2014, and were analyzed by November 4, 2014.

2. **Calibration: Acceptable.**

Applicable calibration results were within QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. Duplicate Analysis: Satisfactory.

A laboratory batch duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits except Th-234 and U-235; associated sample results were qualified as estimated quantities with an unknown bias (JK or UJK).

7. Laboratory Control Sample (LCS) Analysis: Satisfactory.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

8. Efficiency Check: Acceptable.

All efficiency results were within the established control limits.

9. Overall Assessment of Data for Use

In cases where only the 'NET' peak is found by the laboratory software, and the software performs a net quantification, the nuclide result will be flagged with an 'NQ' qualifier on the final reports by the laboratory. This indicates that the nuclide is not detected or supported at any level above the reported MDC; the data reviewer changed the 'NQ' qualifier to 'U'.

The results for all samples were "G" and "J" flagged by the laboratory to denote that there were density and geometry mismatches relative to the calibration standards. The samples were counted by placement of the vials lying down on the detectors. All values should be considered estimated quantities with unknown biases (JK or UJK).

The laboratory has found there to be a significant low bias to 214Pb and 214Bi results when using a mixed nuclide gamma source for efficiency calibrations. The magnitude of this bias was determined to be approximately 32% for 214Bi, and 23% for 214Pb. Therefore, any reported results for 214Pb and 214Bi are qualified as estimated quantities with a low bias (JL or UJL).

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods and laboratory SOPs, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

<u>Data Qualifiers and Definitions</u>

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and `meet quality control criteria. The presence or absence of the analyte cannot be verified.

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100010
Lab ID: 1410833-1
Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 0.0719 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141549d03

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	30 +/- 160	290		U,G,J
14913-49-6	Bi-212	40 +/- 500	920		U,G,J
14733-03-0	Bi-214	50 +/- 97	164		U,G,J
13966-00-2	K-40	450 +/- 700	1170		U,G,J
15100-28-4	Pa-234m	0 +/- 6200	12100		U,G,J
15092-94-1	Pb-212	-25 +/- 46	86		U,G,J
15067-28-4	Pb-214	34 +/- 63	107		U,G,J
15623-47-9	Th-227	-40 +/- 130	250		U,G,J
15065-10-8	Th-234	160 +/- 550	940		U,G,J
14913-50-9	Tl-208	-11 +/- 40	75		U,G,J
15117-96-1	U-235	-10 +/- 110	210		U,G,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100010
Lab ID: 1410833-1
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 0.0719 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141549d03a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	110 +/- 65	92	1	UJ ~~M,NQ,J,G~~

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

12-4-14

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100011
Lab ID: 1410833-2
Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.53 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141873d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	24 +/- 32	52		UJK U,G,J
14913-49-6	Bi-212	-110 +/- 160	270		U,G,J
14733-03-0	Bi-214	-1 +/- 20	34		U,G,J
13966-00-2	K-40	42 +/- 77	128		U,G,J
15100-28-4	Pa-234m	272000 +/- 32000	3000		JK G,J
15092-94-1	Pb-212	-13 +/- 18	30		UJK U,G,J
15067-28-4	Pb-214	8 +/- 22	37		U,G,J
15623-47-9	Th-227	-46 +/- 63	105		U,G,J
15065-10-8	Th-234	122000 +/- 14000	1000		JK G,J
14913-50-9	Tl-208	2 +/- 11	19		UJK U,G,J
15117-96-1	U-235	1400 +/- 180	120		JK G,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100011
Lab ID: 1410833-2
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.53 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141873d04a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	10 +/- 22	37	1	UJ~~U,M,J,G~~

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

MW 12-4-14

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100012
Lab ID: 1410833-3
Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.84 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 140903d06

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	-40 +/- 33	57		UJK U,G,J
14913-49-6	Bi-212	70 +/- 160	260		U,G,J
14733-03-0	Bi-214	0 +/- 21	34		U,G,J
13966-00-2	K-40	52 +/- 62	101		U,G,J
15100-28-4	Pa-234m	294000 +/- 35000	3000		JK G,J
15092-94-1	Pb-212	-6 +/- 20	33		UJK U,G,J
15067-28-4	Pb-214	-1 +/- 21	35		U,G,J
15623-47-9	Th-227	7 +/- 70	116		U,G,J
15065-10-8	Th-234	97000 +/- 11000	1000		JK G,J
14913-50-9	Tl-208	-1 +/- 12	19		UJK U,G,J
15117-96-1	U-235	1180 +/- 150	120		JK G,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100012
Lab ID: 1410833-3
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.84 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 140903d06a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	-12 +/- 21	36	1	UJK ~~U,M,G,J~~

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

12-4-14

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100014
Lab ID: 1410833-4
Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 0.428 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141264d07

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	22 +/- 43	72		UJK U,G,J
14913-49-6	Bi-212	-230 +/- 230	420		U,G,J
14733-03-0	Bi-214	33 +/- 33	53		U,G,J
13966-00-2	K-40	130 +/- 140	230		U,G,J
15100-28-4	Pa-234m	230000 +/- 29000	4000		JK G,J
15092-94-1	Pb-212	-4 +/- 26	44		UJK U,G,J
15067-28-4	Pb-214	9 +/- 28	48		U,G,J
15623-47-9	Th-227	-29 +/- 91	154		U,G,J
15065-10-8	Th-234	106000 +/- 12000	1000		JK G,J
14913-50-9	Tl-208	-10 +/- 17	30		UJK U,G,J
15117-96-1	U-235	1320 +/- 190	170		JK G,J

MW

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

MW 12-4-14

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100014
Lab ID: 1410833-4
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 0.428 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141264d07a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	17 +/- 28	47	1	UJK ~~U,M,G,J~~ Mw

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

MW 12-4-14

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100016
Lab ID: 1410833-5
Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 0.627 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141183d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	-15 +/- 33	62		UJK U,G,J
14913-49-6	Bi-212	20 +/- 170	300		U,G,J
14733-03-0	Bi-214	10 +/- 25	42		U,G,J
13966-00-2	K-40	42 +/- 92	159		U,G,J
15100-28-4	Pa-234m	191000 +/- 24000	3000		JK ~~G,J~~
15092-94-1	Pb-212	-5 +/- 18	31		UJK U,G,J
15067-28-4	Pb-214	15 +/- 24	39		U,G,J
15623-47-9	Th-227	34 +/- 62	102		U,G,J
15065-10-8	Th-234	104000 +/- 12000	0		JK G,J
14913-50-9	Tl-208	0 +/- 14	23		UJK U,G,J
15117-96-1	U-235	1380 +/- 180	110		JK G,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100016
Lab ID: 1410833-5
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 0.627 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141183d08a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	19 +/- 24	39	1	UJ ~~U,M,G,J~~

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

12-4-14

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100017
Lab ID: 1410833-6
Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.59 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141004d10

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	4 +/- 19	32		U,G,J
14913-49-6	Bi-212	-10 +/- 100	170		U,G,J
14733-03-0	Bi-214	0 +/- 13	21		U,G,J
13966-00-2	K-40	18 +/- 31	53		U,G,J
15100-28-4	Pa-234m	199000 +/- 24000	1000		G,J
15092-94-1	Pb-212	-5 +/- 12	20		U,G,J
15067-28-4	Pb-214	2 +/- 12	20		U,G,J
15623-47-9	Th-227	-21 +/- 42	70		U,G,J
15065-10-8	Th-234	101000 +/- 12000	0		G,J
14913-50-9	Tl-208	5.6 +/- 6.9	11.2		U,G,J
15117-96-1	U-235	1310 +/- 160	80		G,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100017
Lab ID: 1410833-6
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.59 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141004d10a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	3 +/- 12	20	1	UJK UM,C,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

12-4-14

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Duplicate Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100017
Lab ID: 1410833-6DUP

Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.59 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141550d03

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	-3 +/- 19	33		UJK U,G,J
14913-49-6	Bi-212	-40 +/- 100	180		U,G,J
14733-03-0	Bi-214	13 +/- 14	22		U,G,J
13966-00-2	K-40	33 +/- 45	74		U,G,J
15100-28-4	Pa-234m	151000 +/- 18000	2000		JK G,J
15092-94-1	Pb-212	8 +/- 12	19		UJK U,G,J
15067-28-4	Pb-214	5 +/- 11	23		U,G,J
15623-47-9	Th-227	-51 +/- 41	69		U,G,J
15065-10-8	Th-234	64900 +/- 7600	400		JK D,G,J
14913-50-9	Tl-208	-0.6 +/- 7.0	11.9		UJK U,G,J
15117-96-1	U-235	840 +/- 110	80		D,G,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:
TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration
BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Duplicate Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100017
Lab ID: 1410833-6DUP
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.59 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141550d03a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	0 +/- 11	23	1	UJK ~~U,M,G,J~~ MW

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:
TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration
BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

MW 12-4-14

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100021
Lab ID: 1410833-7

Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.54 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141874d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	2 +/- 35	59		UJK U,G,J
14913-49-6	Bi-212	-50 +/- 260	430		U,G,J
14733-03-0	Bi-214	-5 +/- 22	38		U,G,J
13966-00-2	K-40	11 +/- 74	129		U,G,J
15100-28-4	Pa-234m	308000 +/- 37000	3000		JK G,J
15092-94-1	Pb-212	1 +/- 21	34		UJK U,G,J
15067-28-4	Pb-214	16 +/- 25	42		U,G,J
15623-47-9	Th-227	-17 +/- 73	121		U,G,J
15065-10-8	Th-234	125000 +/- 15000	1000		JK G,J
14913-50-9	Tl-208	-6 +/- 12	21		UJK U,G,J
15117-96-1	U-235	1450 +/- 190	140		JK G,J

MW

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100021
Lab ID: 1410833-7
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.54 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141874d04a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	18 +/- 25	42	1	UJ ~~U,M,G,J~~

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100024
Lab ID: 1410833-8
Library: NATURAL.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 20-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.09 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 140904d06

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	-29 +/- 48	83		UJK U,G,J
14913-49-6	Bi-212	240 +/- 230	380		U,G,J
14733-03-0	Bi-214	-8 +/- 31	52		U,G,J
13966-00-2	K-40	70 +/- 100	160		U,G,J
15100-28-4	Pa-234m	278000 +/- 33000	4000		JK G,J
15092-94-1	Pb-212	10 +/- 24	40		UJK U,G,J
15067-28-4	Pb-214	6 +/- 30	50		U,G,J
15623-47-9	Th-227	-52 +/- 85	142		U,G,J
15065-10-8	Th-234	20100 +/- 2400	500		JK G,J
14913-50-9	Tl-208	-4 +/- 17	29		UJK U,G,J
15117-96-1	U-235	223 +/- 63	103		JK G,J

MW

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1410833
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-02

Field ID: 14100024
Lab ID: 1410833-8
Library: RA226.LIB

Sample Matrix: SOLID
Prep SOP: PAI 739 Rev 11
Date Collected: 20-Oct-14
Date Prepared: 03-Nov-14
Date Analyzed: 04-Nov-14

Prep Batch: GS141103-5
QCBatchID: GS141103-5-1
Run ID: GS141103-5B
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 1.09 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 140904d06a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	7 +/- 30	49	1	UJK ~~U,M,G,J~~

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSS1410833-1*

MW 12-4-14

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 5, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of two liquid samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Total uranium analysis (EPA Method 6020A and lab SOP 827) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered: 141001022 141001023

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 12, 2014, and were analyzed by November 11, 2014, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis.

2. **Initial and Continuing Calibration: Acceptable.**

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **ICP Interference Check Sample: Acceptable.**

An Interference Check Sample (ICS) was analyzed at the beginning of each sequence. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

5. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results

were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

7. ICP Serial Dilution: Acceptable.

A batch serial dilution analysis was performed per matrix per concentration or per sample delivery group, whichever was more frequent. All serial dilution results were within QC limits.

8. Matrix Spike (MS)/MS Duplicate (MSD) Analysis: Acceptable.

Batch MS/MSD analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. Spike and spike duplicate recoveries were within the QC limits.

9. Duplicate Analysis: Acceptable.

A laboratory batch duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

10. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

11. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Total URANIUM

Method SW6020 Revision A

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: Ecology and Environment, Inc.
Client Project ID: 10NL 14-10-0005-03
Work Order Number: 1411159
Reporting Basis: As Received
Prep Method: SW3050B
Analyst: Ross Miller

Final Volume: 50 ml
Matrix: WLIQUID
Result Units: MG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ	Flag	Sample Aliquot
141001022	1411159-1	10/12/2014	11/11/2014	11/11/2014	N/A	100	31000	0.5		0.1 g
141001023	1411159-2	10/12/2014	11/11/2014	11/11/2014	N/A	100	1200	0.5		0.1 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *im1411159-1*

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: December 4, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of two liquid samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Ra-228 analysis (Lab SOP 724) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered: 141001022 141001023

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 12, 2014, and were analyzed by November 18, 2014.

2. **Calibration: Acceptable.**

Applicable calibration results were within QC limits.

3. **Blanks: Acceptable.**

There were no detections in any blanks.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. **Laboratory Control Sample (LCS) Analysis: Acceptable.**

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

7. Background, Efficiency Check, and Chemical Yield: Acceptable.

All background, efficiency check, and chemical yield results were within the established control limits.

8. Overall Assessment of Data for Use

The ICP-AES measurement of barium concentration prior to chemical separation for sample 141001022 showed a concentration less than the amount known to have been added to the sample in the form of barium carrier. To avoid and minimize the potential low bias in the final analytical results for this sample, the known concentration of the carrier was used in the chemical yield calculations in lieu of the pre-separation measurement. The sample results with a low bias of 15% or less in the pre-separation measurement is qualified as an estimated quantity with a low bias (JL).

Due to uncertainty associated with the ICP-AES determination of barium concentration in the samples, the calculated yield for sample 141001023 fell between 100% and 110%. To minimize the potential for low bias, the result has been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. This sample result is qualified as an estimated quantity with a low bias (JL).

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods and laboratory SOPs, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and `meet quality control criteria. The presence or absence of the analyte cannot be verified.

Radium-228 Analysis by GFPC

PAI 724 Rev 11

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001022
Lab ID: 1411159-1

Sample Matrix: WLIQUID
Prep SOP: SOP749 Rev 2
Date Collected: 12-Oct-14
Date Prepared: 14-Nov-14
Date Analyzed: 18-Nov-14

Prep Batch: RA141112-3
QCBatchID: RA141112-3-3
Run ID: RA141112-3A
Count Time: 120 minutes
Report Basis: As Received

Final Aliquot: 0.529 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: RAC1118

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	6.8 +/- 1.8 JL	1.3	5	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31370	28900	ug	92.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *RA1411159-1*

Radium-228 Analysis by GFPC

PAI 724 Rev 11

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001023
Lab ID: 1411159-2

Sample Matrix: WLIQUID
Prep SOP: SOP749 Rev 2
Date Collected: 12-Oct-14
Date Prepared: 14-Nov-14
Date Analyzed: 18-Nov-14

Prep Batch: RA141112-3
QCBatchID: RA141112-3-3
Run ID: RA141112-3A
Count Time: 120 minutes
Report Basis: As Received

Final Aliquot: 0.522 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: RAC1118

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	1.68 +/- 0.72 JL	1.16	5	~~Y1,~~LT MW

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32980	33290	ug	101	40 - 110 %	Y1

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *RA1411159-1*

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MEMORANDUM

DATE: December 4, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of two liquid samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Ra-226 analysis (EPA Method 903.1 and Lab SOP 783) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered: 141001022 141001023

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 12, 2014, and were analyzed by November 26, 2014.

2. **Calibration and Efficiency Performance Checks: Acceptable.**

Applicable calibration and efficiency performance check results were within QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. **Laboratory Control Sample (LCS) Analysis: Acceptable.**

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

7. Chemical Yield: Acceptable.

All chemical yield results were within the established control limits.

9. Overall Assessment of Data for Use

The ICP-AES measurement of barium concentrations prior to chemical separation for sample 141001022 showed concentrations less than the amount known to have been added to the sample in the form of barium carrier. To avoid and minimize the potential low bias in the final analytical results for this sample, the known concentration of the carrier was used in the chemical yield calculations in lieu of the pre-separation measurement. The sample result with a low bias of 15% or less in the pre-separation measurement is qualified as an estimated quantity with a low bias (UJL).

Due to uncertainty associated with the ICP-AES determination of barium concentration in the samples, the calculated yield for sample 141001023 fell between 100% and 110%. To minimize the potential for low bias, results have been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. This sample result is qualified as an estimated quantity with a low bias (UJL).

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods and laboratory SOPs, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and `meet quality control criteria. The presence or absence of the analyte cannot be verified.

Ra-226 by Radon Emanation - Method 903.1

PAI 783 Rev 10

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001022
Lab ID: 1411159-1

Sample Matrix: WLIQUID
Prep SOP: PAI 783 Rev 10
Date Collected: 12-Oct-14
Date Prepared: 14-Nov-14
Date Analyzed: 26-Nov-14

Prep Batch: RE141113-1
QCBatchID: RE141113-1-5
Run ID: RE141113-1A
Count Time: 30 minutes
Report Basis: As Received

Final Aliquot: 0.330 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	0.43 +/- 0.47	0.74	1	U JL

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	31370	28900	ug	92.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *RE1411159-1*

Ra-226 by Radon Emanation - Method 903.1

PAI 783 Rev 10

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001023
Lab ID: 1411159-2

Sample Matrix: WLIQUID
Prep SOP: PAI 783 Rev 10
Date Collected: 12-Oct-14
Date Prepared: 14-Nov-14
Date Analyzed: 26-Nov-14

Prep Batch: RE141113-1
QCBatchID: RE141113-1-5
Run ID: RE141113-1A
Count Time: 30 minutes
Report Basis: As Received

Final Aliquot: 0.326 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	0.24 +/- 0.26	0.38	1	~~Y1,U~~ UJL Mw

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
BARIUM	32980	33290	ug	101	40 - 110 %	Y1

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *RE1411159-1*

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MEMORANDUM

DATE: December 4, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of two liquid samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Isotopic uranium analysis (Lab SOP 714) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M)..

The samples were numbered: 141001022 141001023

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on October 12, 2014, and were analyzed by November 13, 2014.

2. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

3. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

4. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

5. **Laboratory Control Sample Analysis: Acceptable.**

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

6. Chemical Yield, Background, Energy, and Efficiency Check Results: Satisfactory.

All chemical yield, background, energy, and efficiency check results were within the established control limits. Sample 141001022 has a chemical recovery of 8.56%, below the 30% lower control limit due to high levels of native activity. The results are submitted without further qualification. This sample result is qualified as an estimated quantity with a low bias (JL).

7. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 12

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001022
Lab ID: 1411159-1

Sample Matrix: WLIQUID
Prep SOP: PAI 778 Rev 14
Date Collected: 12-Oct-14
Date Prepared: 14-Nov-14
Date Analyzed: 23-Nov-14

Prep Batch: AS141114-1
QCBatchID: AS141114-1-4
Run ID: AS141114-1UR
Count Time: 1000 minutes
Report Basis: As Received

Final Aliquot: 0.0354 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: Spectrum #1

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13966-29-5	U-234	1800 +/- 360	0	0.1	JL Y2,M3
15117-96-1	U-235	246 +/- 54	5	0.1	JL Y2,M3
7440-61-1	U-238	13100 +/- 2600	0	0.1	JL Y2,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	126.7	10.8	pCi/g	8.56	30 - 110 %	~~Y2~~

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *UR1411159-1*

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 12

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001023
Lab ID: 1411159-2

Sample Matrix: WLIQUID
Prep SOP: PAI 778 Rev 14
Date Collected: 12-Oct-14
Date Prepared: 14-Nov-14
Date Analyzed: 22-Nov-14

Prep Batch: AS141114-1
QCBatchID: AS141114-1-4
Run ID: AS141114-1UR
Count Time: 360 minutes
Report Basis: As Received

Final Aliquot: 0.0875 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: Spectrum #1

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13966-29-5	U-234	65 +/- 12	1	0.1	M3
15117-96-1	U-235	7.0 +/- 2.0	0.8	0.1	M3
7440-61-1	U-238	446 +/- 76	1	0.1	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	51.26	29.2	pCi/g	56.9	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *UR1411159-1*

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MEMORANDUM

DATE: December 5, 2014

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Data Quality Assurance Review,**
Boise Radiation Apartment Response Site, Boise, Idaho

REF: TDD: 14-10-0005 PAN: 00104530.0004.075.02

The data quality assurance review of two liquid samples collected from the Boise Radiation Apartment Response site in Boise, Idaho, has been completed. Gamma Spectroscopy analyses (Lab SOP 713) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered: 141001022 141001023

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

   The samples were collected on October 12, 2014, and were analyzed by November 13, 2014.

2. **Calibration: Acceptable.**

   Applicable calibration results were within QC limits.

3. **Blanks: Acceptable.**

   There were no detections in any blanks.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

   Performance evaluation samples were not provided to the laboratory.

6. **Duplicate Analysis: Satisfactory.**

   A laboratory batch duplicate analysis was performed per SDG or per matrix per concentration

level, whichever was more frequent. Duplicate values exceeding QC limits were qualified as estimated quantities with an unknown bias (JK or UJK).

7. Laboratory Control Sample (LCS) Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits. The density for sample 141001023 was noted as differing by more than +/- 15% from the LCS density; associated positive sample results were qualified as estimated with a high bias (JH).

8. Background Analysis: Acceptable.

All background results were within the established control limits.

9. Overall Assessment of Data for Use

ALS has found there to be a significant low bias to 214Pb and 214Bi results when using a mixed nuclide gamma source for efficiency calibrations. The magnitude of this bias has been determined to be approximately 32% for 214Bi, and 23% for 214Pb. Therefore, any results for 214Pb and 214Bi are flagged as estimated quantities with a low bias (JL or UJL).

The efficiency calibrations used in the activity calculations for these samples were obtained using a NIST traceable mixed gamma source consisting of 100g of sand. Samples 141001022 and 141001023 are waste liquid. Due to differences between the calibration standard and the samples, the analytical results may be biased and are qualified as estimated quantities with an unknown bias (JK or UJK).

Elevated levels of 234mPa activity may interfere with the accurate quantification of 95Nb. This is attributable to low-abundance gamma emissions of 234mPa occurring at similar emission energies as 95Nb. This results in a "false-positive" activity measurement for 95Nb. In both samples, 95Nb was qualified as not detected (U).

In cases where only the 'NET' peak is found, and the software performs a net quantification, the nuclide result was flagged with an 'NQ' qualifier by the laboratory on the final reports to indicate that the nuclide is not detected or supported at any level above the reported MDC; the data reviewer changed these qualifiers to 'U'.

Sample results qualified 'TI' by the laboratory to indicate a tentative identification were changed to 'NJ' by the data reviewer.

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods and laboratory SOPs, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and `meet quality control criteria. The presence or absence of the analyte cannot be verified.

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001022
Lab ID: 1411159-1
Library: FANP.LIB

Sample Matrix: WLIQUID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 12-Nov-14
Date Analyzed: 13-Nov-14

Prep Batch: GS141112-4
QCBatchID: GS141112-4-1
Run ID: GS141112-4A
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 88.5 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141336d07

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	0.2 +/- 1.0	1.7		UJK
14391-76-5	Ag-110m	0.78 +/- 0.33	0.70		NJK
14682-66-7	Al-26	0.41 +/- 0.16	0.18		JK
14596-10-2	Am-241	34.0 +/- 7.6	10.4		UJK
13966-02-4	Be-7	2.8 +/- 4.4	7.3		UJK
14913-49-6	Bi-212	-1.9 +/- 6.3	10.6		UJK
14733-03-0	Bi-214	0.24 +/- 0.78	1.29		UJK
13982-30-4	Ce-139	-0.74 +/- 0.75	1.23		UJK
14762-78-8	Ce-144	2.5 +/- 4.5	7.3		UJK
14093-03-9	Co-56	1.36 +/- 0.51	0.70		NJK
13981-50-5	Co-57	0.43 +/- 0.34	0.54		UJK
13981-38-9	Co-58	-0.21 +/- 0.78	1.32		UJK
10198-40-0	Co-60	-0.05 +/- 0.20	0.36		UJK
14392-02-0	Cr-51	-1.0 +/- 6.0	10.0		UJK
13967-70-9	Cs-134	0.08 +/- 0.38	0.63		UJK

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSL1411159-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001022
Lab ID: 1411159-1
Library: FANP.LIB

Sample Matrix: WLIQUID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 12-Nov-14
Date Analyzed: 13-Nov-14

Prep Batch: GS141112-4
QCBatchID: GS141112-4-1
Run ID: GS141112-4A
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 88.5 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141336d07

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
10045-97-3	Cs-137	-0.27 +/- 0.42	0.71	0.5	UJK
14683-23-9	Eu-152	-0.7 +/- 1.1	2.0		U
15585-10-1	Eu-154	-0.1 +/- 1.5	2.6		U
14391-16-3	Eu-155	1.7 +/- 1.4	2.3		U
14596-12-4	Fe-59	-0.14 +/- 0.55	0.96		U
10043-66-0	I-131	4.3 +/- 4.9	8.1		U
13966-00-2	K-40	0.8 +/- 1.9	3.2		U
13966-31-9	Mn-54	-0.26 +/- 0.59	1.00		U
13966-32-0	Na-22	-0.01 +/- 0.21	0.36		U
14681-63-1	Nb-94	1.04 +/- 0.43	0.66		JK
13967-76-5	Nb-95	53.9 +/- 6.4	1.1		UJK
15100-28-4	Pa-234m	17700 +/- 2100	100		JK
15092-94-1	Pb-212	-0.37 +/- 0.60	1.01		UJK
15067-28-4	Pb-214	0.67 +/- 0.62	1.15		UJK
13967-48-1	Ru-106	-1.0 +/- 3.6	6.0		UJK

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSL1411159-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001022
Lab ID: 1411159-1
Library: FANP.LIB

Sample Matrix: WLIQUID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 12-Nov-14
Date Analyzed: 13-Nov-14

Prep Batch: GS141112-4
QCBatchID: GS141112-4-1
Run ID: GS141112-4A
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 88.5 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141336d07

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14683-10-4	Sb-124	0.07 +/- 0.53	0.88		U JK
14234-35-6	Sb-125	0.5 +/- 1.0	1.7		U JK
13967-63-0	Sc-46	0.57 +/- 0.36	0.57		WJK-SI mu
15623-47-9	Th-227	0.8 +/- 2.0	3.4		U JK
15065-10-8	Th-234	9700 +/- 1100	0		JK
14913-50-9	Tl-208	0.21 +/- 0.44	0.73		U JK
15117-96-1	U-235	142 +/- 17	4		JK
13982-39-3	Zn-65	0.19 +/- 0.42	0.70		U JK

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSL1411159-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001022
Lab ID: 1411159-1
Library: RA226.LIB

Sample Matrix: WLIQUID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 12-Nov-14
Date Analyzed: 13-Nov-14

Prep Batch: GS141112-4
QCBatchID: GS141112-4-1
Run ID: GS141112-4A
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 88.5 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141336d07A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	0.74 +/- 0.62	1.14	1	UJK

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSL1411159-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001023
Lab ID: 1411159-2
Library: FANP.LIB

Sample Matrix: WLIQUID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 12-Nov-14
Date Analyzed: 13-Nov-14

Prep Batch: GS141112-4
QCBatchID: GS141112-4-1
Run ID: GS141112-4A
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 60.2 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141250d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14331-83-0	Ac-228	-0.14 +/- 0.50	0.94		U,G
14391-76-5	Ag-110m	-0.03 +/- 0.15	0.27		U,G
14682-66-7	Al-26	0.03 +/- 0.13	0.25		U,G
14596-10-2	Am-241	0.34 +/- 0.42	0.70		U,G
13966-02-4	Be-7	0.3 +/- 1.5	2.6		U,G
14913-49-6	Bi-212	-1.1 +/- 2.0	3.8		U,G
14733-03-0	Bi-214	0.06 +/- 0.28	0.49		U,G,J
13982-30-4	Ce-139	-0.035 +/- 0.084	0.150		U,G
14762-78-8	Ce-144	-0.23 +/- 0.61	1.07		U,G
14093-03-9	Co-56	0.03 +/- 0.18	0.34		U,G
13981-50-5	Co-57	0.090 +/- 0.086	0.139		U,G
13981-38-9	Co-58	0.02 +/- 0.19	0.33		U,G
10198-40-0	Co-60	0.007 +/- 0.088	0.175		U,G
14392-02-0	Cr-51	-1.5 +/- 1.8	3.3		U,G
13967-70-9	Cs-134	0.20 +/- 0.13	0.20		U,G,NQ

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSL1411159-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001023
Lab ID: 1411159-2
Library: FANP.LIB

Sample Matrix: WLIQUID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 12-Nov-14
Date Analyzed: 13-Nov-14

Prep Batch: GS141112-4
QCBatchID: GS141112-4-1
Run ID: GS141112-4A
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 60.2 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141250d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
10045-97-3	Cs-137	0.01 +/- 0.14	0.25	0.5	UJK U,G
14683-23-9	Eu-152	-0.43 +/- 0.56	1.23		U,G
15585-10-1	Eu-154	-2.7 +/- 1.5	3.1		U,G
14391-16-3	Eu-155	0.03 +/- 0.32	0.54		U,G
14596-12-4	Fe-59	-0.21 +/- 0.30	0.63		U,G
10043-66-0	I-131	-0.1 +/- 1.6	2.8		U,G
13966-00-2	K-40	0.3 +/- 1.4	2.6		U,G
13966-31-9	Mn-54	0.09 +/- 0.12	0.20		U,G
13966-32-0	Na-22	0.05 +/- 0.11	0.20		U,G
14681-63-1	Nb-94	-0.01 +/- 0.14	0.25		U,G
13967-76-5	Nb-95	1.77 +/- 0.40	0.38		UJK G,SI
15100-28-4	Pa-234m	621 +/- 98	37		UJK G
15092-94-1	Pb-212	0 +/- 0.16	0.29		UJK U,G
15067-28-4	Pb-214	-0.09 +/- 0.23	0.42		UJK U,G,J
13967-48-1	Ru-106	0.3 +/- 1.2	2.2		UJK U,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSL1411159-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001023
Lab ID: 1411159-2
Library: FANP.LIB

Sample Matrix: WLIQUID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 12-Nov-14
Date Analyzed: 13-Nov-14

Prep Batch: GS141112-4
QCBatchID: GS141112-4-1
Run ID: GS141112-4A
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 60.2 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141250d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
14683-10-4	Sb-124	0.16 +/- 0.18	0.29		U,G
14234-35-6	Sb-125	0.01 +/- 0.32	0.57		U,G
13967-63-0	Sc-46	0.08 +/- 0.14	0.23		U,G
15623-47-9	Th-227	0.17 +/- 0.48	0.82		U,G
15065-10-8	Th-234	412 +/- 49	4		
14913-50-9	Tl-208	-0.06 +/- 0.15	0.27		U,G
15117-96-1	U-235	5.84 +/- 0.97	1.04		
13982-39-3	Zn-65	0.08 +/- 0.21	0.38		U,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSL1411159-1*

Gamma Spectroscopy Results

PAI 713 Rev 13

Sample Results

Lab Name: ALS Environmental -- FC
Work Order Number: 1411159
Client Name: Ecology and Environment, Inc.
ClientProject ID: 10NL 14-10-0005-03

Field ID: 141001023
Lab ID: 1411159-2
Library: RA226.LIB

Sample Matrix: WLIQUID
Prep SOP: PAI 739 Rev 11
Date Collected: 12-Oct-14
Date Prepared: 12-Nov-14
Date Analyzed: 13-Nov-14

Prep Batch: GS141112-4
QCBatchID: GS141112-4-1
Run ID: GS141112-4A
Count Time: 60 minutes
Report Basis: As Received

Final Aliquot: 60.2 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 141250d08A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13982-63-3	Ra-226	-0.02 +/- 0.21	0.38	1	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSL1411159-1*

Attachment B-2 Treasure Valley Removal Action Support

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ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: January 20, 2015

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Treasure Valley Radiation Removal Support Site, Idaho

REF: TDD: 14-12-0002 PAN: 00104530.0004.081.02

The data quality assurance review of two filter samples collected from the Treasure Valley Radiation Removal Support site in Idaho has been completed. Gross alpha/beta analyses (Lab SOP 724) were performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered: 14120001 14120002

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on December 8 and 9, 2014, and were analyzed by December 19, 2014.

2. **Calibration: Acceptable.**

All calibration results were within QC limits.

3. **Blanks: Satisfactory.**

A blank was analyzed for each 20 samples or per matrix per concentration level. Gross beta activity was detected in method blank AB141218-3MB at 1.74 +/- 0.80 pCi/sample; sample results less than five times the blank results were qualified as not detected (U).

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

7. Duplicate Sample Analysis: Acceptable.

Duplicate analysis of sample 14120002 was performed in lieu of prepared duplicates. All duplicate results were within the established control limits.

8. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Gross Alpha/Beta Analysis by GFPC Wipe/Filter Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NP
Client Project Number: 14-11-0003-01
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1412326

Reported on: Friday, January 16, 2015 9:58:27 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	DL	Units	Matrix	Prep Batch	Date Analyzed	Flags
1412326-1	14120001	Sample	GROSS ALPHA	0.04 +/- 0.26	0.71	NA	pCi/sample	FILTER	AB141218-3	12/19/2014	U
1412326-1	14120001	Sample	GROSS BETA	4.3 +/- 1.2	1.5	NA	pCi/sample	FILTER	AB141218-3	12/19/2014	U
1412326-2	14120002	Sample	GROSS ALPHA	0.25 +/- 0.32	0.64	NA	pCi/sample	FILTER	AB141218-3	12/19/2014	U
1412326-2	14120002	Sample	GROSS BETA	3.7 +/- 1.1	1.4	NA	pCi/sample	FILTER	AB141218-3	12/19/2014	U LT M

Comments:

Data Package ID: *AB1412326-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
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MEMORANDUM

DATE: January 20, 2015

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Treasure Valley Radiation Removal Support Site, Idaho

REF: TDD: 14-12-0002 PAN: 00104530.0004.081.02

The data quality assurance review of one solid, two filter, and two sediment samples collected from the Treasure Valley Radiation Removal Support site in Idaho has been completed. Total uranium analysis (EPA Method 6020A and lab SOP 827) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14120001	14120002	14120101	14120102	14120103

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on December 8 and 9, 2014, and were analyzed by January 12, 2015, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis.

2. **Initial and Continuing Calibration: Acceptable.**

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **ICP Interference Check Sample: Acceptable.**

An Interference Check Sample (ICS) was analyzed at the beginning of each sequence. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

5. Precision and Bias Determination: Not Performed.

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

7. ICP Serial Dilution: Acceptable.

A batch serial dilution analysis was performed per matrix per concentration or per sample delivery group, whichever was more frequent. All serial dilution results were within QC limits.

8. Matrix Spike (MS)/MS Duplicate (MSD) Analysis: Acceptable.

MS/MSD analyses were performed per SDG or per matrix per concentration level, whichever was more frequent. Spike and spike duplicate recoveries were within the QC limits.

9. Duplicate Analysis: Acceptable.

A laboratory batch duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

10. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

11. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Total URANIUM

Method SW6020 Revision A

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: Ecology and Environment, Inc.
Client Project ID: 10NP 14-11-0003-01
Work Order Number: 1412326
Reporting Basis: As Received
Prep Method: SW3050B
Analyst: Brent A. Stanfield

Final Volume: 100 ml
Matrix: FILTER
Result Units: UG/sample

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ/LOD	Flag	Sample Aliquot
14120001	1412326-1	12/08/2014	01/12/2015	01/12/2015	N/A	10	0.019	0.01		1 sample
14120002	1412326-2	12/09/2014	01/12/2015	01/12/2015	N/A	10	0.028	0.01		1 sample

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *im1412326-1*

MW 1-2015

Total URANIUM

Method SW6020 Revision A

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: Ecology and Environment, Inc.
Client Project ID: 10NP 14-11-0003-01
Work Order Number: 1412326
Reporting Basis: Dry Weight
Prep Method: SW3050B
Analyst: Brent A. Stanfield

Final Volume: 100 ml
Matrix: SEDIMENT
Result Units: UG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ/LOD	Flag	Sample Aliquot
14120101	1412326-3	12/09/2014	12/28/2014	12/30/2014	13.9	10	200	9.6		1.204 g
14120102	1412326-4	12/09/2014	12/28/2014	12/30/2014	12.9	10	510	9		1.273 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *im1412326-1*

JMW 1-2015

Total URANIUM

Method SW6020 Revision A

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: Ecology and Environment, Inc.
Client Project ID: 10NP 14-11-0003-01
Work Order Number: 1412326
Reporting Basis: As Received
Prep Method: SW3050B
Analyst: Brent A. Stanfield

Final Volume: 100 ml
Matrix: SOLID
Result Units: UG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ/LOD	Flag	Sample Aliquot
14120103	1412326-5	12/09/2014	12/28/2014	12/30/2014	N/A	1000	260000	990		1.013 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *im1412326-1*

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MEMORANDUM

DATE: January 20, 2015

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Treasure Valley Radiation Removal Support Site, Idaho

REF: TDD: 14-12-0002 PAN: 00104530.0004.081.02

The data quality assurance review of one solid, two sediment, and two filter samples collected from the Treasure Valley Radiation Removal Support site in Idaho has been completed. Isotopic uranium analysis (Lab SOP 714) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered:

14120001 14120002 14120101 14120102 14120103

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on December 8 and 9, 2014, and were analyzed by January 14, 2015.

2. **Calibration: Acceptable.**

All calibration results were within QC limits.

3. **Blanks: Satisfactory.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. Uranium-235 activity is reported in filter method blank at 0.013 +/- 0.021 pCi/sample; sample results less than five times the positive blank results were qualified as not detected (U).

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. **Laboratory Control Sample Analysis: Acceptable.**

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

7. **Chemical Yield, Background, Energy, and Efficiency Check Results: Acceptable.**

All chemical yield, background, energy, and efficiency check results were within the established control limits.

8. **Overall Assessment of Data for Use**

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

From the lab narrative: this analytical method quantifies U-235 alpha activity in a specific region of interest corresponding to emission energies between those of U-234 and U-238. A potential limitation of this method is that measurable amounts of U-234 in the sample may cause a small amount of characteristic activity in the U-235 region of interest due to poorly resolved alpha activity at the boundary between the two regions. To minimize the potential for a high bias in the U-235 analytical results, the U-235 region of interest has been narrowed and limited to a lower energy region. An 85.1% abundance correction has been made to the final U-235 results.

The requested MDC of 0.1pCi/L was not met for sample 14120103. The reported activity for this sample is greater than the achieved MDC; no actions were taken based on this discrepancy.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NP
Client Project Number: 14-11-0003-01
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1412326

Reported on: Friday, January 16, 2015 1:02:59 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	DL	Units	Matrix	Prep Batch	Date Analyze	Flags
1412326-1	14120001	Sample	U-234	0.013 +/- 0.012	0.017	NA	pCi/sample	FILTER	AS150105-1	1/12/2015	U
1412326-1	14120001	Sample	U-235	0.0038 +/- 0.0093	0.0052	NA	pCi/sample	FILTER	AS150105-1	1/12/2015	U
1412326-1	14120001	Sample	U-238	0.018 +/- 0.011	0.004	NA	pCi/sample	FILTER	AS150105-1	1/12/2015	LT
1412326-2	14120002	Sample	U-234	0.008 +/- 0.013	0.022	NA	pCi/sample	FILTER	AS150105-1	1/12/2015	U
1412326-2	14120002	Sample	U-235	0.012 +/- 0.012	0.006	NA	pCi/sample	FILTER	AS150105-1	1/12/2015	U LT
1412326-2	14120002	Sample	U-238	0.010 +/- 0.014	0.022	NA	pCi/sample	FILTER	AS150105-1	1/12/2015	U
1412326-3	14120101	Sample	U-234	0.39 +/- 0.12	0.04	NA	pCi/g	SEDIMENT	AS150102-1	1/8/2015	
1412326-3	14120101	Sample	U-235	0.008 +/- 0.031	0.023	NA	pCi/g	SEDIMENT	AS150102-1	1/8/2015	U
1412326-3	14120101	Sample	U-238	0.29 +/- 0.10	0.05	NA	pCi/g	SEDIMENT	AS150102-1	1/8/2015	

Comments:

MW 1-20-15

Data Package ID: *UR1412326-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NP
Client Project Number: 14-11-0003-01
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1412326

Reported on: Friday, January 16, 2015 1:02:59 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	DL	Units	Matrix	Prep Batch	Date Analyze	Flags
1412326-4	14120102	Sample	U-234	0.50 +/- 0.17	0.09	NA	pCi/g	SEDIMENT	AS150102-1	1/8/2015	
1412326-4	14120102	Sample	U-235	0.025 +/- 0.047	0.034	NA	pCi/g	SEDIMENT	AS150102-1	1/8/2015	U
1412326-4	14120102	Sample	U-238	0.40 +/- 0.15	0.09	NA	pCi/g	SEDIMENT	AS150102-1	1/8/2015	
1412326-5	14120103	Sample	U-234	11.9 +/- 2.5	0.4	NA	pCi/g	SOLID	AS150109-1	1/13/2015	~~M3~~ MW
1412326-5	14120103	Sample	U-235	1.53 +/- 0.66	0.17	NA	pCi/g	SOLID	AS150109-1	1/13/2015	~~M3~~ MW
1412326-5	14120103	Sample	U-238	88 +/- 15	0	NA	pCi/g	SOLID	AS150109-1	1/13/2015	~~M3~~ MW

Comments:

MW 1-28-15

Data Package ID: *UR1412326-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

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Attachment B-3 Treasure Valley Removal Assessment Operation

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MEMORANDUM

DATE: February 25, 2015

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Treasure Valley Radiation Assessment Operation Site, Idaho

REF: TDD: 14-11-0003 PAN: 00104530.0004.080.02

The data quality assurance review of two filter samples collected from the Treasure Valley Radiation Assessment Operation site in Idaho has been completed. Gross alpha/beta analyses (Lab SOP 724) were performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered: 15011001 15011002

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on January 21, 2015, and were analyzed by February 3, 2015.

2. **Calibration: Acceptable.**

All calibration results were within QC limits.

3. **Blanks: Acceptable.**

A blank was analyzed for each 20 samples or per matrix per concentration level. No target analytes were detected in the method blank.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. **Laboratory Control Sample Analysis: Acceptable.**

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were

within the established control limits.

7. Duplicate Sample Analysis: Acceptable.

Duplicate analysis of sample 15011001 was performed in lieu of prepared duplicates. All duplicate results were within the established control limits.

8. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Gross Alpha/Beta Analysis by GFPC Wipe/Filter Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NP
Client Project Number: 14-11-0003-01
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1501405

Reported on: Monday, February 23, 2015 7:06:54 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	DL	Units	Matrix	Prep Batch	Date Analyzed	Flags
1501405-1	15011001	Sample	GROSS ALPHA	0.29 +/- 0.35	0.68	NA	pCi/sample	FILTER	AB150130-1	2/3/2015	U
1501405-1	15011001	Sample	GROSS BETA	3.9 +/- 1.2	1.4	NA	pCi/sample	FILTER	AB150130-1	2/3/2015	LT
1501405-2	15011002	Sample	GROSS ALPHA	0 +/- 0.20	0.61	NA	pCi/sample	FILTER	AB150130-1	2/3/2015	U
1501405-2	15011002	Sample	GROSS BETA	3.1 +/- 1.0	1.4	NA	pCi/sample	FILTER	AB150130-1	2/3/2015	LT

Comments:

Data Package ID: *AB1501405-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

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MEMORANDUM

DATE: February 25, 2015

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Treasure Valley Radiation Assessment Operation Site, Idaho

REF: TDD: 14-11-0003 PAN: 00104530.0004.080.02

The data quality assurance review of two filter samples collected from the Treasure Valley Radiation Assessment Operation site in Idaho has been completed. Isotopic uranium analysis (Lab SOP 714) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered: 15011001 15011002

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on January 21, 2015, and were analyzed by February 12, 2015.

2. **Calibration: Acceptable.**

All calibration results were within QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. No analytes were detected in the method blank.

4. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

5. **Performance Evaluation Sample Analysis: Not Provided.**

Performance evaluation samples were not provided to the laboratory.

6. Laboratory Control Sample (LCS)/LCS Duplicate (LCSD) Analysis: Acceptable.

Due to insufficient sample volume, a LCSD was prepared in lieu of a prep batch duplicate. All LCS and LCSD results were within the established control limits.

7. Chemical Yield, Background, Energy, and Efficiency Check Results: Acceptable.

All chemical yield, background, energy, and efficiency check results were within the established control limits.

8. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

From the lab narrative: this analytical method quantifies U-235 alpha activity in a specific region of interest corresponding to emission energies between those of U-234 and U-238. A potential limitation of this method is that measurable amounts of U-234 in the sample may cause a small amount of characteristic activity in the U-235 region of interest due to poorly resolved alpha activity at the boundary between the two regions. To minimize the potential for a high bias in the U-235 analytical results, the U-235 region of interest has been narrowed and limited to a lower energy region. An 85.1% abundance correction has been made to the final U-235 results.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

JH - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a high bias.

JL - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with a low bias.

JK - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias.

JQ – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample with an unknown direction of bias and falls between the MDL and the Minimum (or Practical) Quantitation Limit (MQL, PQL).

N - The analysis indicates the present of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: Ecology and Environment, Inc.
Client Project Name: 10NP
Client Project Number: 14-11-0003-01
Laboratory Name: ALS Environmental -- FC
PAI Work Order: 1501405

Reported on: Tuesday, February 24, 2015 10:12:54 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	DL	Units	Matrix	Prep Batch	Date Analyze	Flags
1501405-1	15011001	Sample	U-234	0.003 +/- 0.022	0.054	NA	pCi/sample	FILTER	AS150206-1	2/12/2015	U
1501405-1	15011001	Sample	U-235	0.019 +/- 0.021	0.028	NA	pCi/sample	FILTER	AS150206-1	2/12/2015	U
1501405-1	15011001	Sample	U-238	-0.003 +/- 0.018	0.050	NA	pCi/sample	FILTER	AS150206-1	2/12/2015	U
1501405-2	15011002	Sample	U-234	0.022 +/- 0.031	0.059	NA	pCi/sample	FILTER	AS150206-1	2/12/2015	U
1501405-2	15011002	Sample	U-235	0.006 +/- 0.022	0.045	NA	pCi/sample	FILTER	AS150206-1	2/12/2015	U
1501405-2	15011002	Sample	U-238	0.006 +/- 0.023	0.054	NA	pCi/sample	FILTER	AS150206-1	2/12/2015	U

MW 2-25-15

Comments:

Data Package ID: *UR1501405-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700, Seattle, WA 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: February 25, 2015

TO: Chris Whitehead, Project Manager, E & E, Seattle, Washington

FROM: Mark Woodke, START-4 Chemist, E & E, Seattle, Washington MW

SUBJ: **Inorganic Data Quality Assurance Review,**
Treasure Valley Radiation Assessment Operation Site, Idaho

REF: TDD: 14-11-0003 PAN: 00104530.0004.080.02

The data quality assurance review of two filter and two soil samples collected from the Treasure Valley Radiation Assessment Operation site in Idaho has been completed. Total uranium analysis (Lab SOP 827) was performed by ALS Environmental, Inc., Fort Collins, Colorado. All sample analyses were evaluated following EPA's Stage 2 and/or 4 Data Validation Electronic and/or Manual Process (S2B/4VE/M).

The samples were numbered: 15011001 15011002 15011003 15011004

Data Qualifications:

1. **Sample Holding Times: Acceptable.**

The samples were collected on January 21, 2015, and were analyzed by February 18, 2015, therefore meeting QC criteria of less than 6 months between collection, extraction, and analysis.

2. **Initial and Continuing Calibration: Acceptable.**

A minimum of one calibration standard and a blank were analyzed at the beginning of the ICP analysis sequence and after every 10 samples. No results were greater than 110% of the highest calibration standard. All ICP recoveries were within the QC limits.

3. **Blanks: Acceptable.**

A preparation blank was analyzed for each 20 samples or per matrix per concentration level. Blanks were analyzed after each Initial or Continuing Calibration Verification. There were no detections in any blanks.

4. **ICP Interference Check Sample: Acceptable.**

An Interference Check Sample (ICS) was analyzed at the beginning of each sequence. All ICS (solution AB) results were within QC limits of 80% - 120% recovery.

5. **Precision and Bias Determination: Not Performed.**

Samples necessary to determine precision and bias were not provided to the laboratory. All results

were flagged "PND" (Precision Not Determined) and "RND" (Recovery Not Determined), although the flags do not appear on the data sheets.

6. Performance Evaluation Sample Analysis: Not Provided.

Performance evaluation samples were not provided to the laboratory.

7. ICP Serial Dilution: Acceptable.

A batch serial dilution analysis was performed per matrix per concentration or per sample delivery group, whichever was more frequent. All serial dilution results were within QC limits.

8. Duplicate Analysis: Acceptable.

A laboratory batch duplicate analysis was performed per SDG or per matrix per concentration level, whichever was more frequent. All duplicate results were within QC limits.

9. Laboratory Control Sample Analysis: Acceptable.

A Laboratory Control Sample (LCS) was analyzed per SDG per matrix. All LCS results were within the established control limits.

10. Overall Assessment of Data for Use

The reviewer used professional judgment to apply a single bias qualifier when more than one bias qualifier was applicable to an individual estimated sample result.

The overall usefulness of the data is based on the criteria outlined in the Site-Specific Sampling Plan and/or Sampling and Quality Assurance Plan, the OSWER Guidance Document "Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan, and Data Validation Procedures" (EPA/540/G-90/004), the analytical methods, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review". Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

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R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Total URANIUM

Method SW6020 Revision A

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: Ecology and Environment, Inc.
Client Project ID: 10NP 14-11-0003-01
Work Order Number: 1501405
Reporting Basis: As Received
Prep Method: SW3050B
Analyst: Brent A. Stanfield

Final Volume: 100 ml
Matrix: FILTER
Result Units: UG/sample

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ/LOD	Flag	Sample Aliquot
15011001	1501405-1	01/21/2015	02/18/2015	02/18/2015	N/A	10	0.01	0.01	U	1 sample
15011002	1501405-2	01/21/2015	02/18/2015	02/18/2015	N/A	10	0.01	0.01	U	1 sample

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *im1501405-1*

MW 2-25-15

Total URANIUM

Method SW6020 Revision A

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: Ecology and Environment, Inc.
Client Project ID: 10NP 14-11-0003-01
Work Order Number: 1501405
Reporting Basis: Dry Weight
Prep Method: SW3050B
Analyst: Brent A. Stanfield

Final Volume: 100 ml
Matrix: SOIL
Result Units: UG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ/LOD	Flag	Sample Aliquot
15011003	1501405-3	01/21/2015	02/18/2015	02/18/2015	23.5	10	950	13		1 g
15011004	1501405-4	01/21/2015	02/18/2015	02/18/2015	25.2	10	910	13		1 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *im1501405-1*

Attachment C Treasure Valley Removal Assessment Operation VIPER Survey Reports

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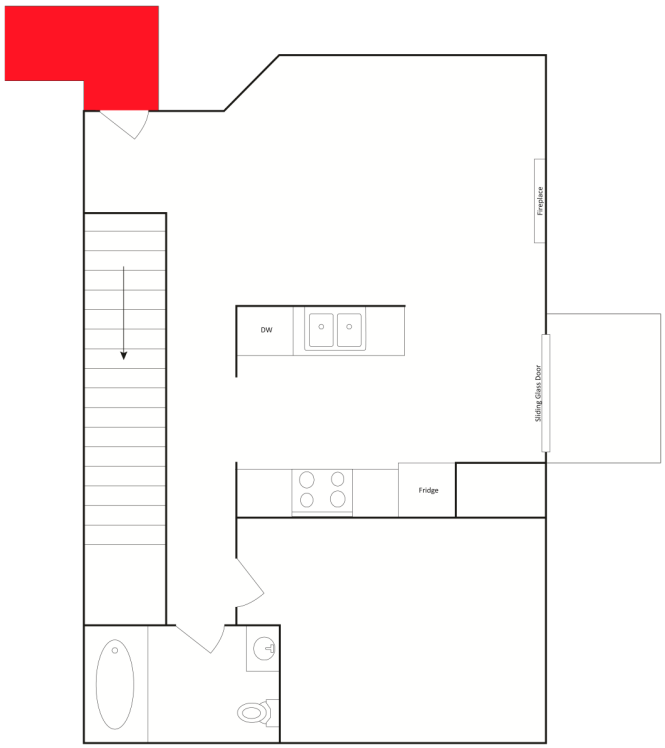
Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	9:27:17 AM
Time Ended	9:32:33 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Concrete (alpha)

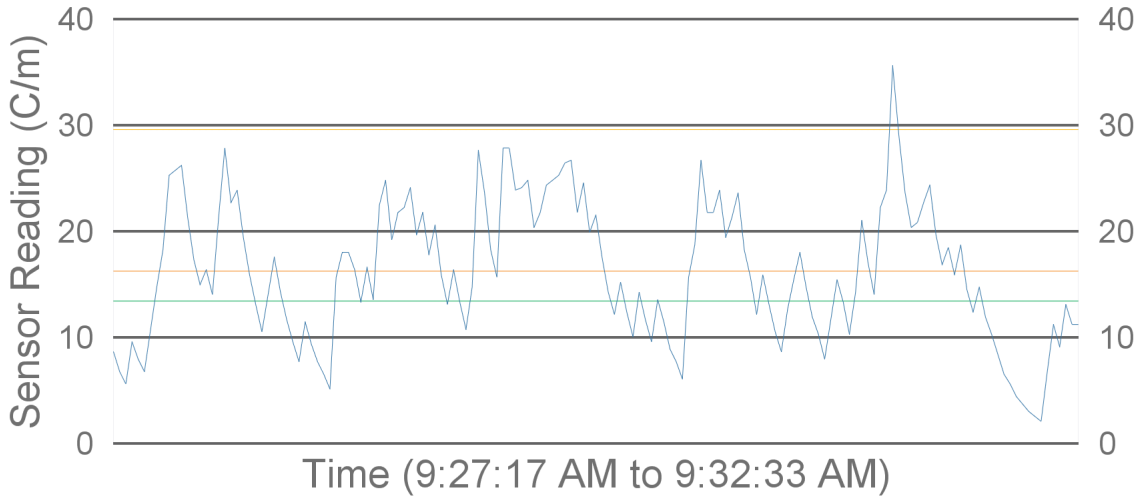


No. of Readings: 161

Max. Value	35.63	**Ave. Bckgrnd**	13.45
Min. Value	2.11	**Action Level**	29.62
Std. Deviation	6.50	**Ave. of Results**	16.27

Matrix:	Concrete
Room:	Front Sidewalk

Survey Results

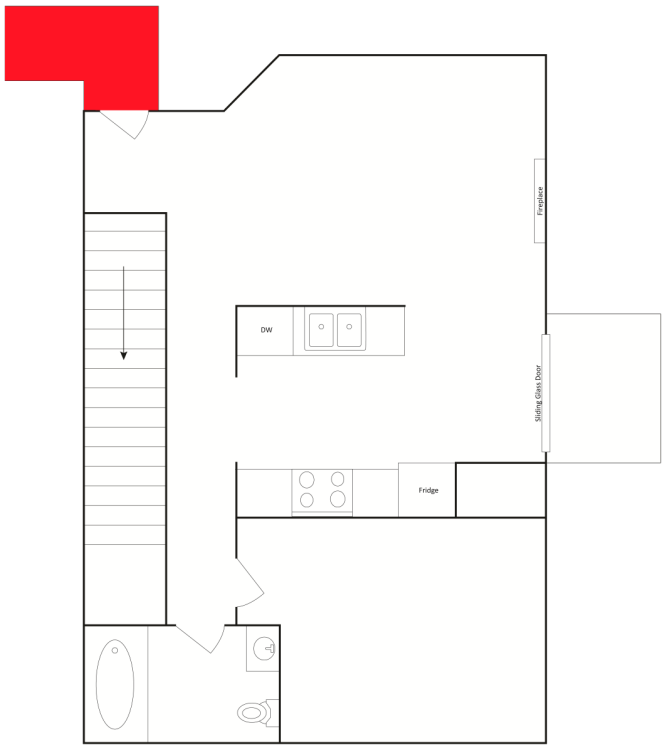


Ratemeter Model 43-90 100 cm2 Alpha Scintillator (Position 2)
Action Level (29.62 C/m)
Background (13.45 C/m)
Average Readingl (16.27 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	9:29:19 AM
Time Ended	9:35:29 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Concrete (beta/gamma)

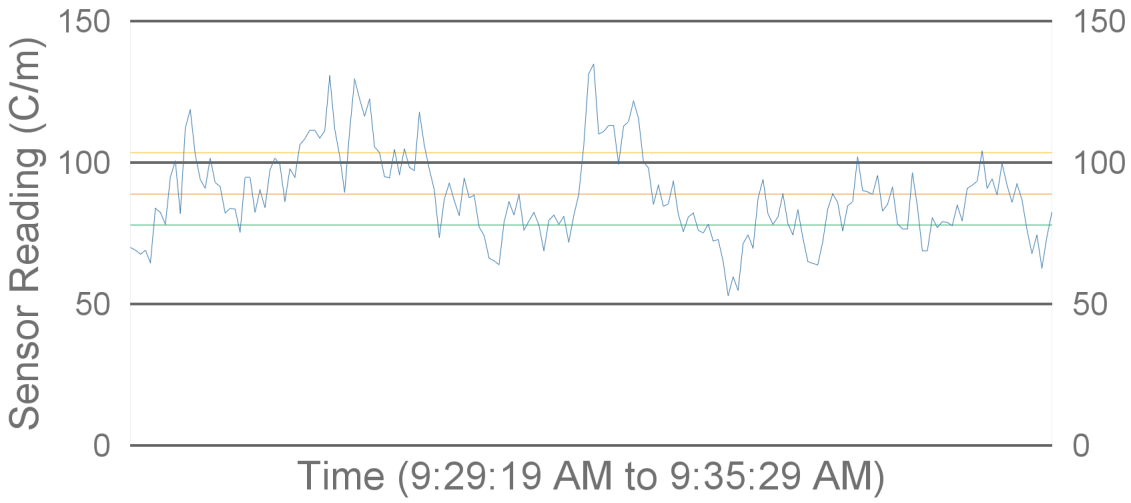


No. of Readings: 191

Max. Value	135.00	**Ave. Bckgrnd**	78.02
Min. Value	52.97	**Action Level**	103.59
Std. Deviation	15.83	**Ave. of Results**	88.99

Matrix:	Concrete
Room:	Front Sidewalk

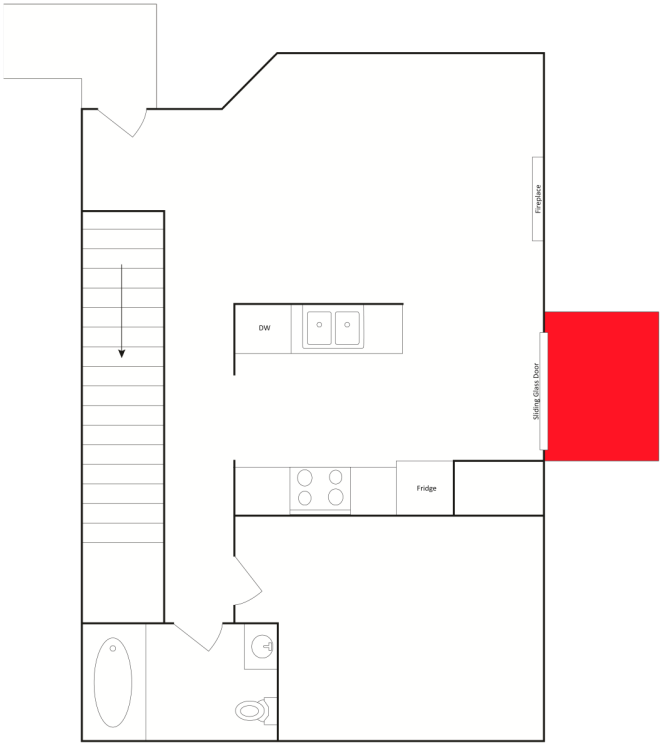
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	9:35:02 AM
Time Ended	9:38:18 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Concrete (alpha)

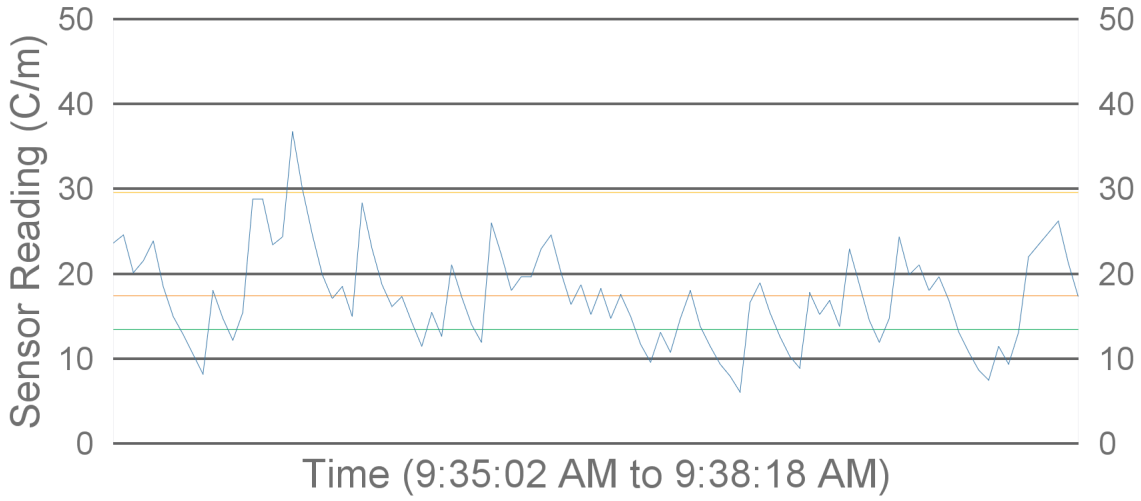


No. of Readings: 99

Max. Value	36.80	**Ave. Bckgrnd**	13.45
Min. Value	6.09	**Action Level**	29.62
Std. Deviation	5.71	**Ave. of Results**	17.43

Matrix:	Concrete
Room:	Back Porch

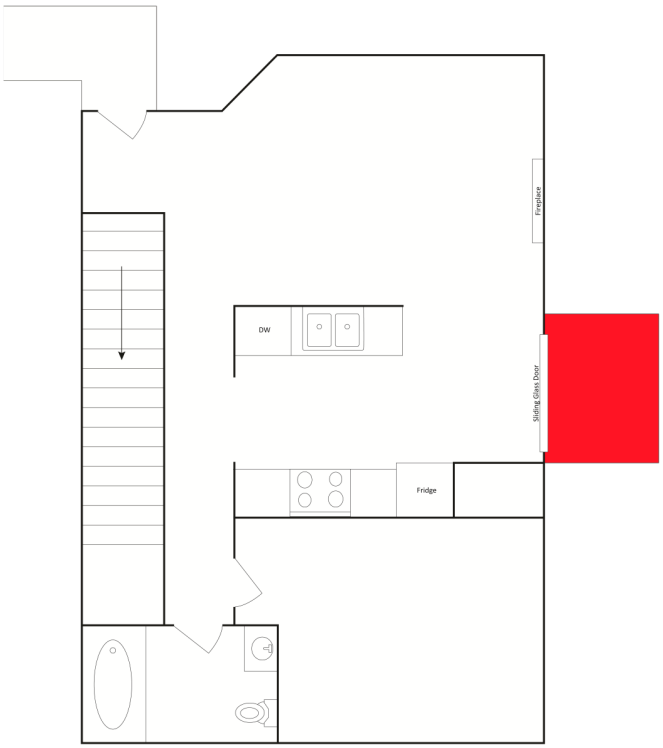
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	9:36:59 AM
Time Ended	9:41:08 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Concrete (beta/gamma)

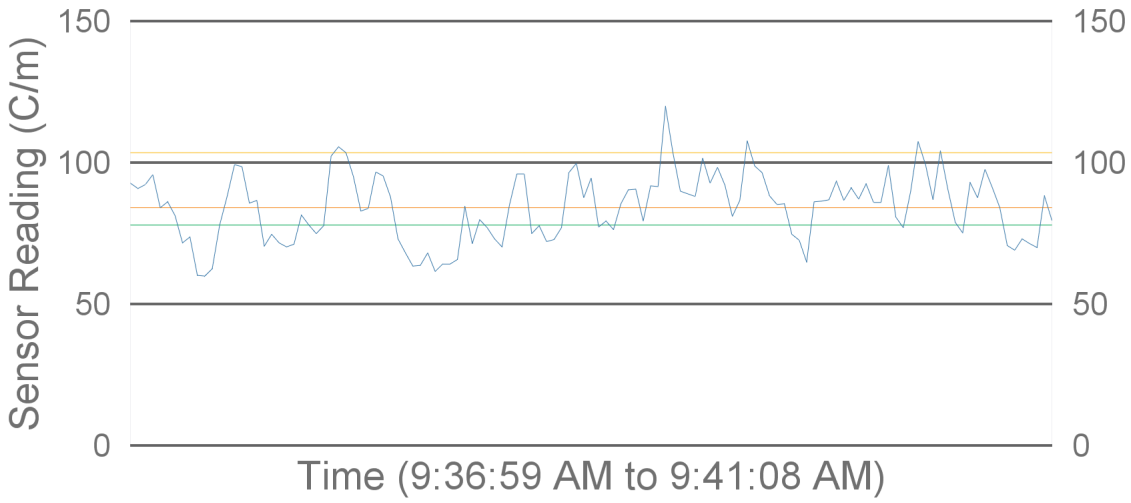


No. of Readings: 128

Max. Value	120.00	**Ave. Bckgrnd**	78.02
Min. Value	60.00	**Action Level**	103.59
Std. Deviation	11.94	**Ave. of Results**	84.17

Matrix:	Concrete
Room:	Back Porch

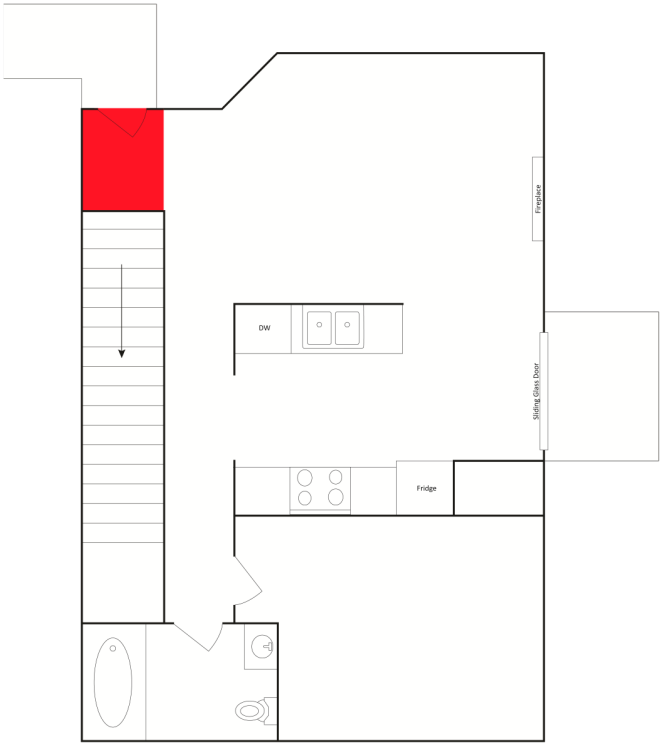
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	9:58:38 AM
Time Ended	10:00:23 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

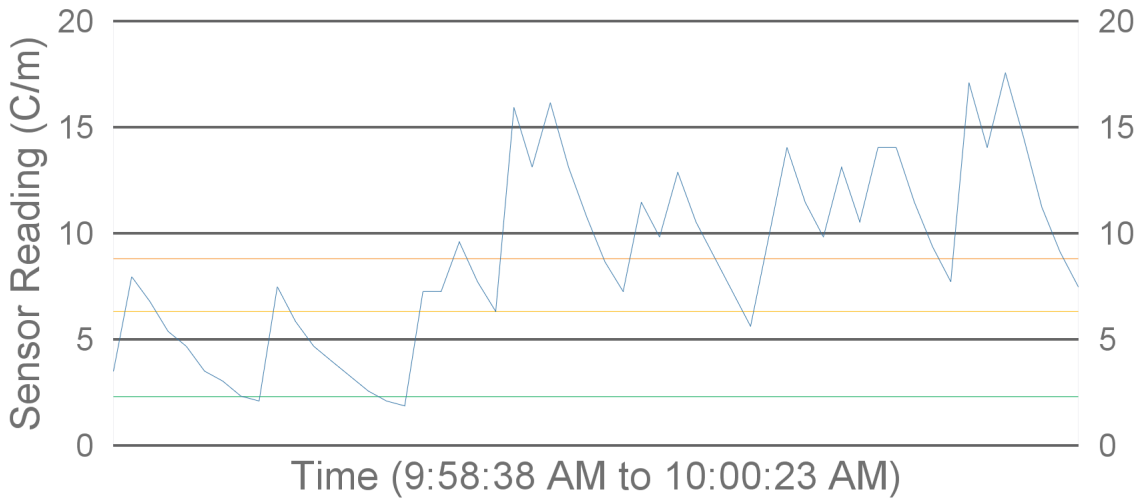


No. of Readings: 55

Max. Value	17.58	**Ave. Bckgrnd**	2.32
Min. Value	1.88	**Action Level**	6.32
Std. Deviation	4.22	**Ave. of Results**	8.82

Matrix:	Linoleum
Room:	First Floor Entryway

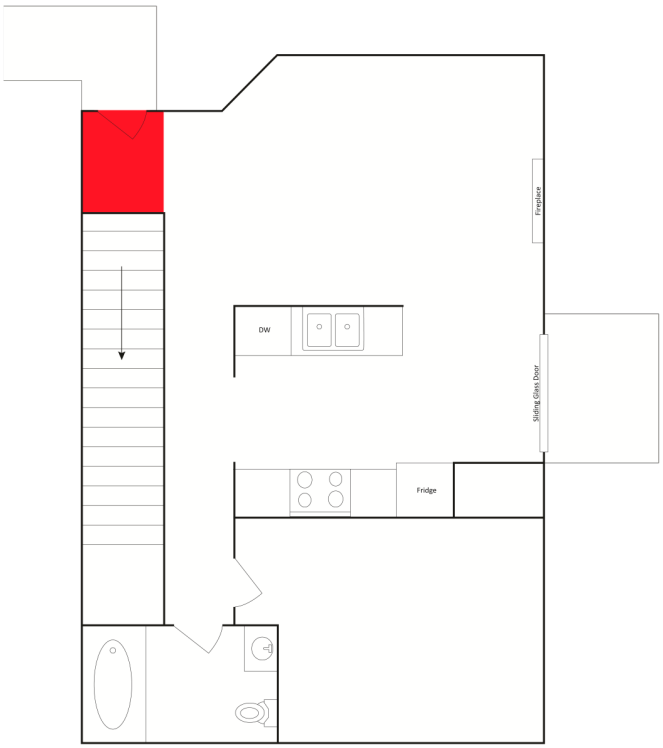
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:00:30 AM
Time Ended	10:03:19 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

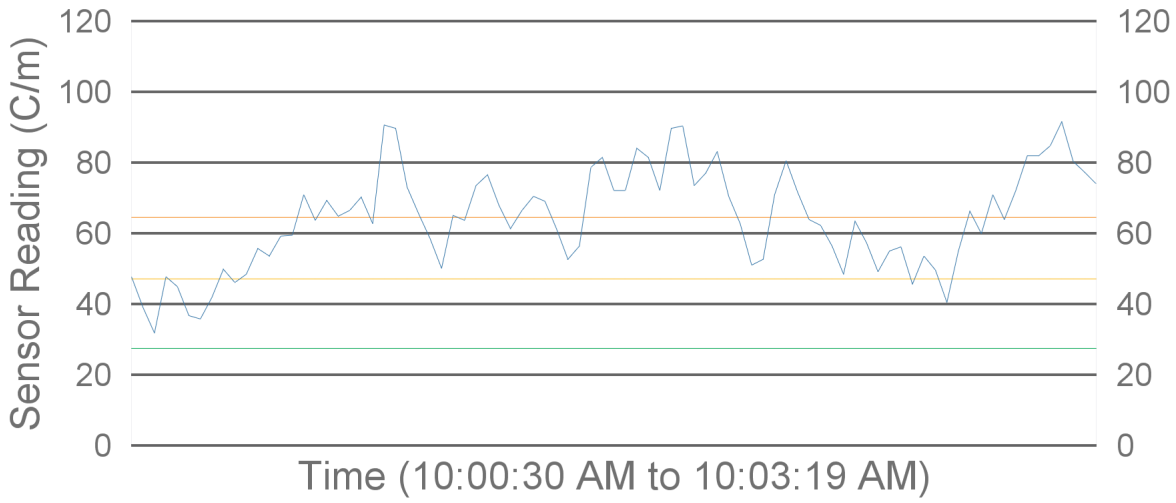


No. of Readings: 86

Max. Value	91.64	**Ave. Bckgrnd**	27.56
Min. Value	31.88	**Action Level**	47.19
Std. Deviation	14.26	**Ave. of Results**	64.57

Matrix:	Linoleum
Room:	First Floor Entryway

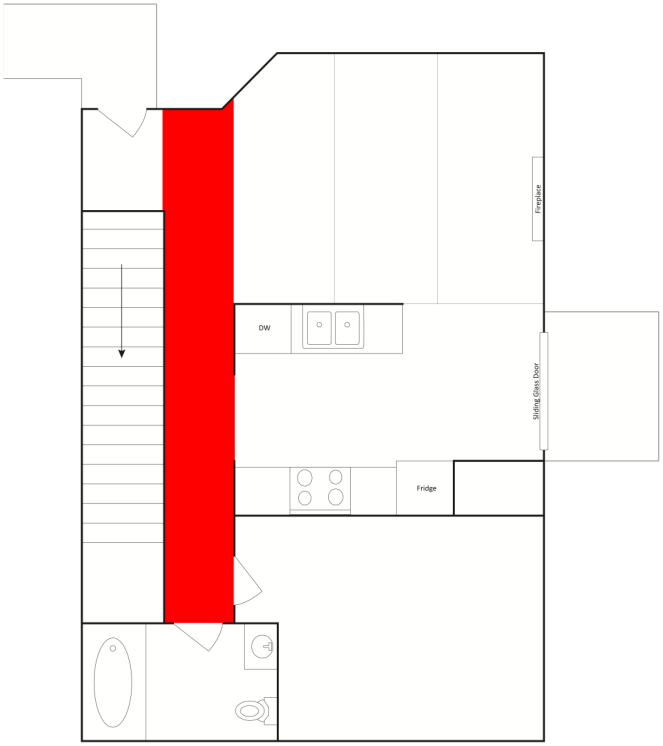
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:07:26 AM
Time Ended	10:13:17 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Carpet (alpha)

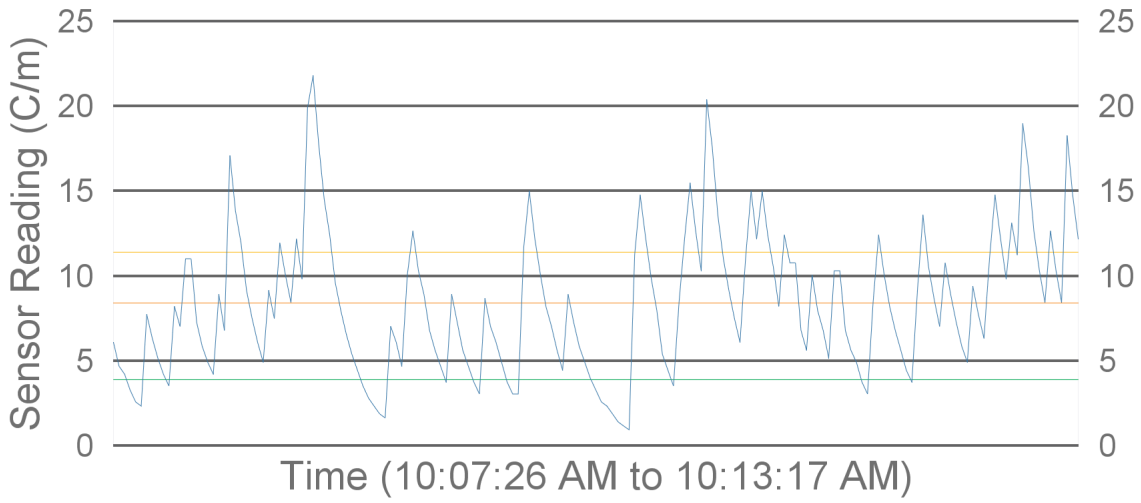


No. of Readings: 178

Max. Value	21.80	**Ave. Bckgrnd**	3.89
Min. Value	0.94	**Action Level**	11.41
Std. Deviation	4.19	**Ave. of Results**	8.41

Matrix:	Carpet
Room:	First Floor Hallway

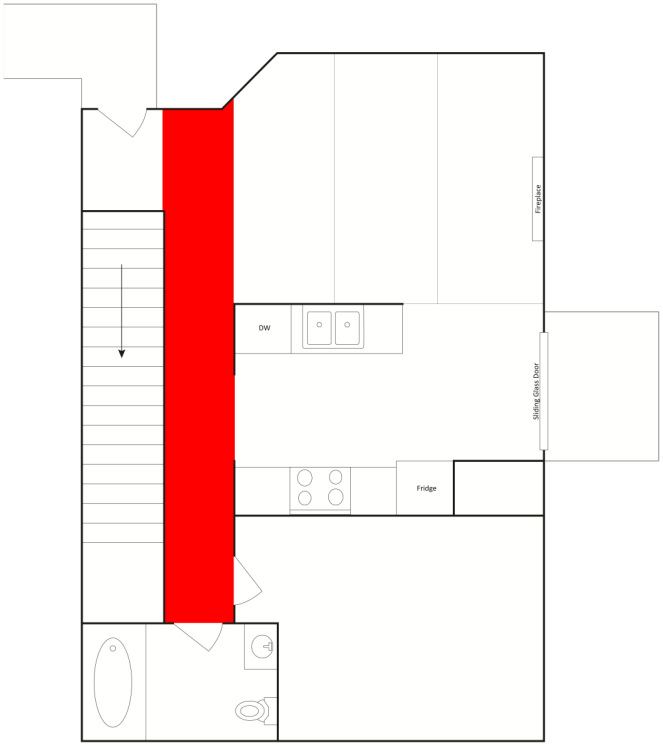
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:09:38 AM
Time Ended	10:17:55 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Carpet (beta/gamma)

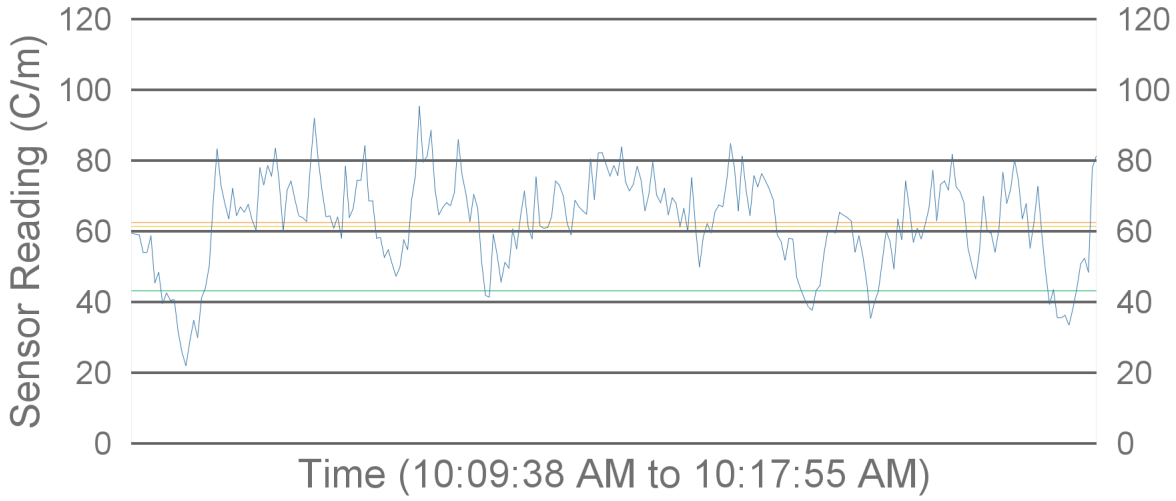


No. of Readings: 256

Max. Value	95.39	**Ave. Bckgrnd**	43.28
Min. Value	22.03	**Action Level**	61.48
Std. Deviation	13.34	**Ave. of Results**	62.58

Matrix:	Carpet
Room:	First Floor Hallway

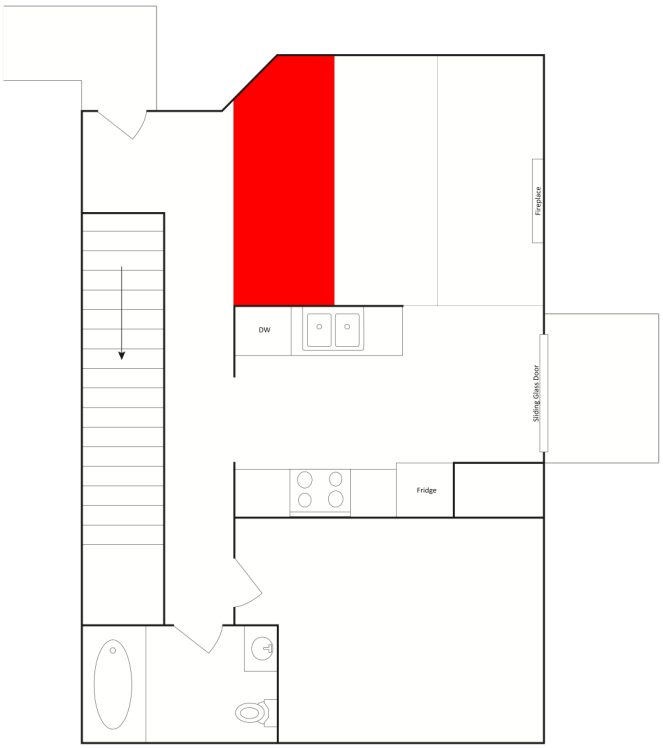
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:14:19 AM
Time Ended	10:20:19 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Carpet (alpha)

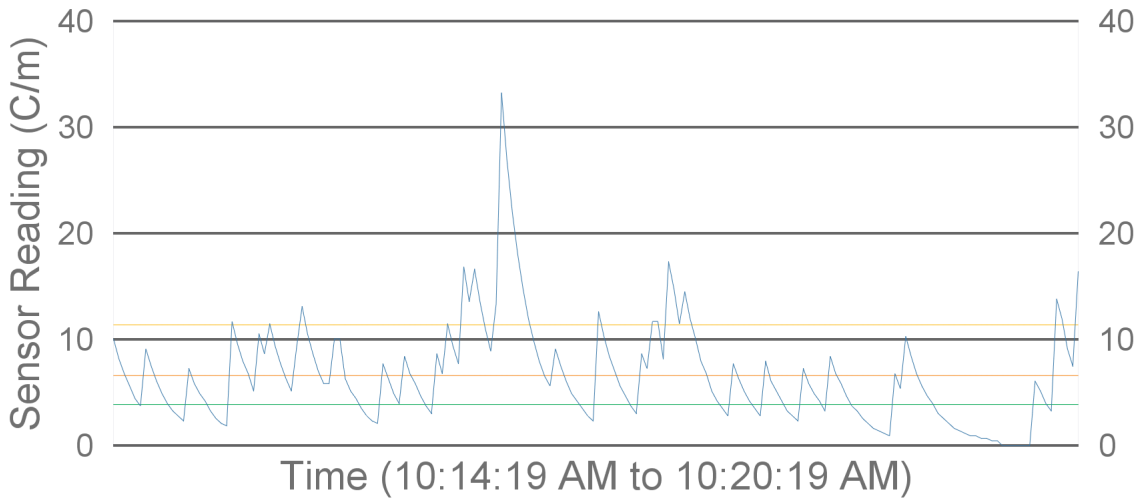


No. of Readings: 185

Max. Value	33.28	**Ave. Bckgrnd**	3.89
Min. Value	0.00	**Action Level**	11.41
Std. Deviation	4.79	**Ave. of Results**	6.62

Matrix:	Carpet
Room:	Living Room (LV) Section 1

Survey Results

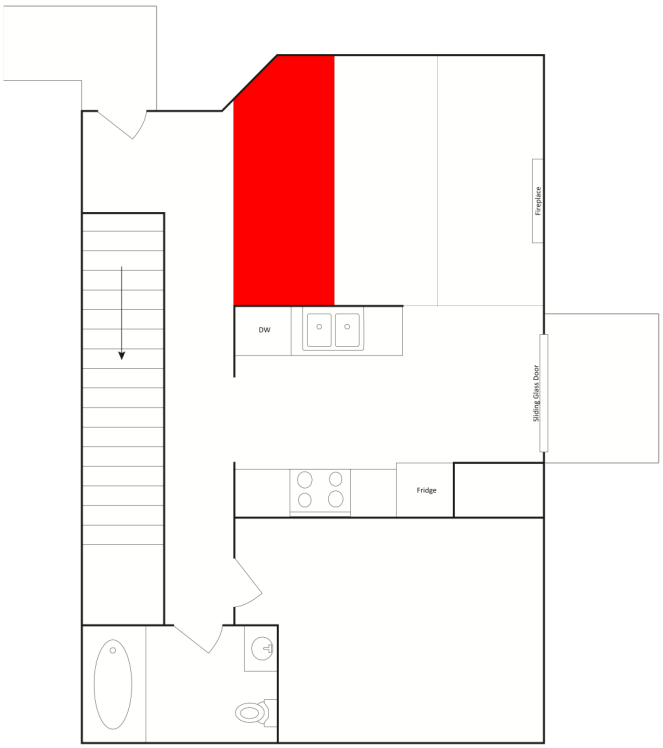


Ratemeter Model 43-90 100 cm2 Alpha Scintillator (Position 2)
Action Level (11.4 C/m)
Background (3.89 C/m)
Average Readingl (6.61 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:18:23 AM
Time Ended	10:25:31 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Carpet (beta/gamma)

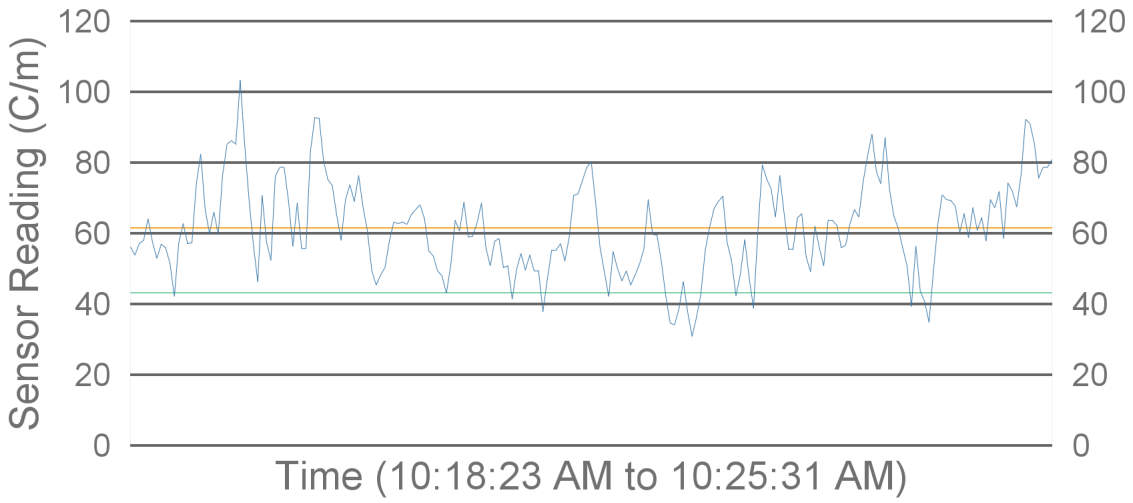


No. of Readings: 218

Max. Value	103.36	**Ave. Bckgrnd**	43.28
Min. Value	30.94	**Action Level**	61.48
Std. Deviation	13.12	**Ave. of Results**	61.70

Matrix:	Carpet
Room:	Living Room (LV) Section 1

Survey Results

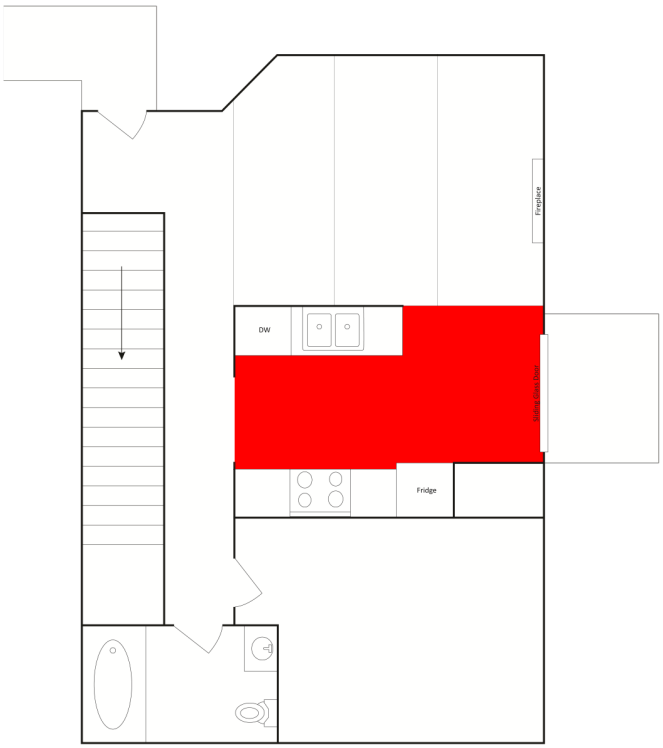


Ratemeter Model 44-9 Pancake G-M Detector (Position 4)
Action Level (61.47 C/m)
Background (43.28 C/m)
Average Readingl (61.69 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:21:22 AM
Time Ended	10:27:20 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

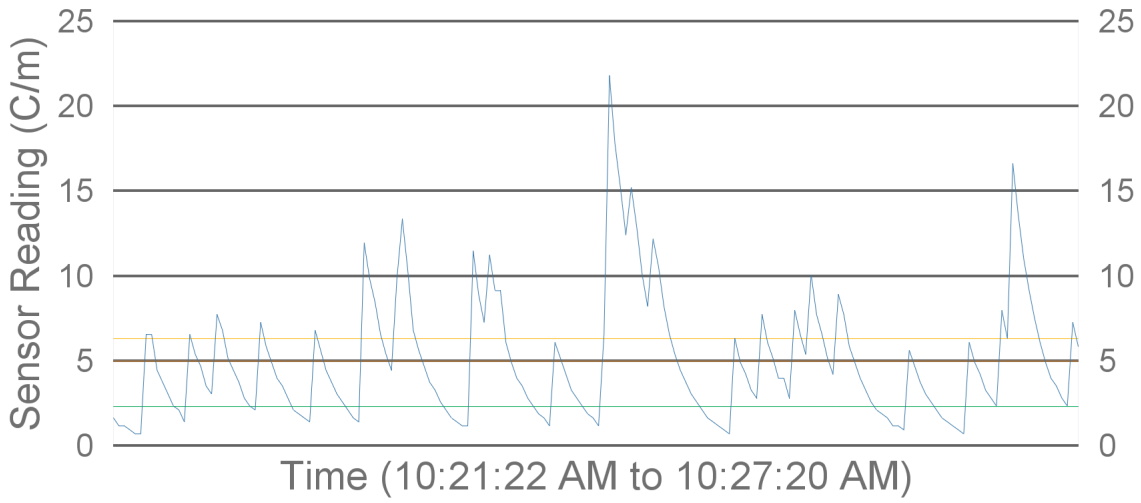


No. of Readings: 183

Max. Value	21.80	**Ave. Bckgrnd**	2.32
Min. Value	0.70	**Action Level**	6.32
Std. Deviation	3.66	**Ave. of Results**	4.99

Matrix:	Linoleum
Room:	Kitchen (KN)

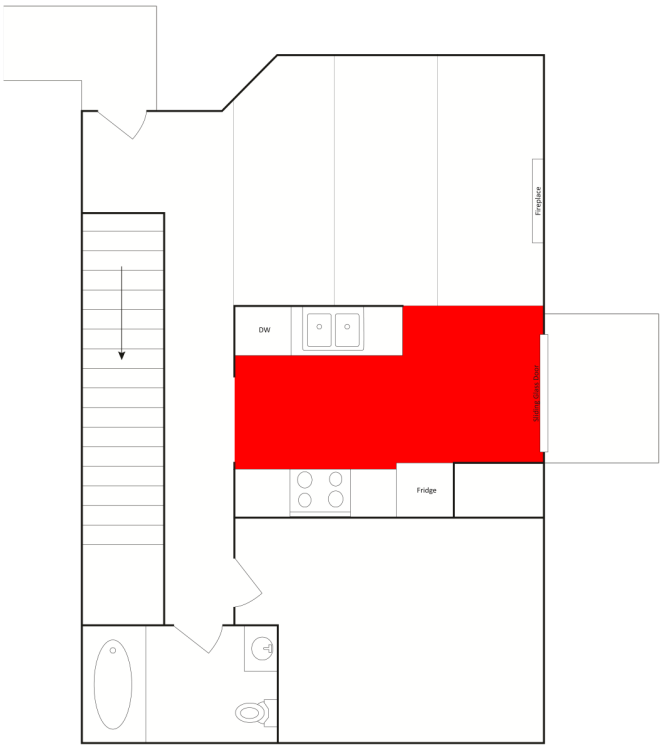
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:25:40 AM
Time Ended	10:33:49 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

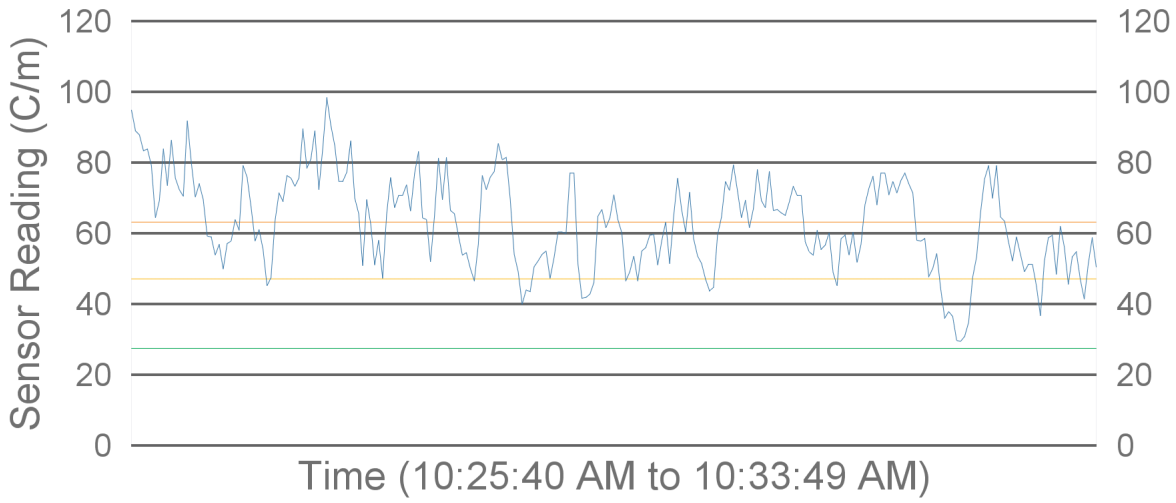


No. of Readings: 251

Max. Value	98.44	**Ave. Bckgrnd**	27.56
Min. Value	29.53	**Action Level**	47.19
Std. Deviation	13.19	**Ave. of Results**	63.25

Matrix:	Linoleum
Room:	Kitchen (KN)

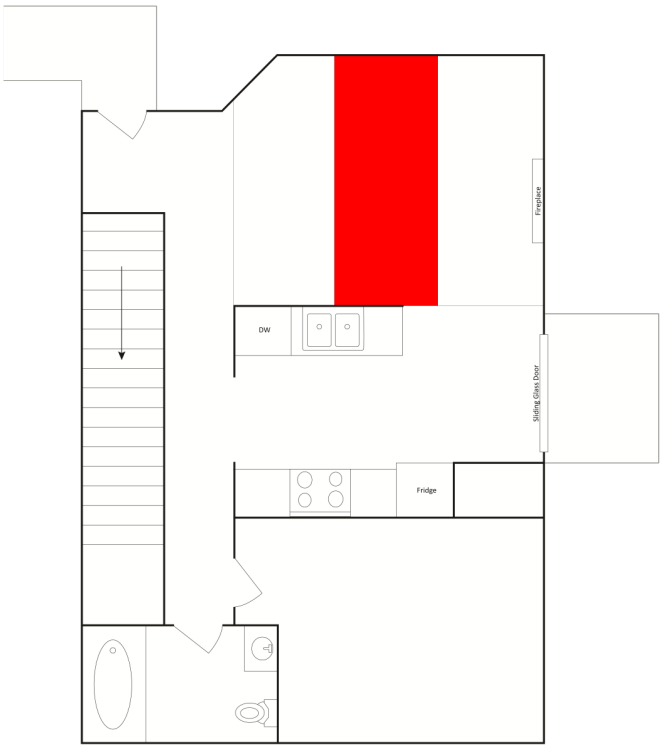
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:31:31 AM
Time Ended	10:35:48 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Carpet (alpha)

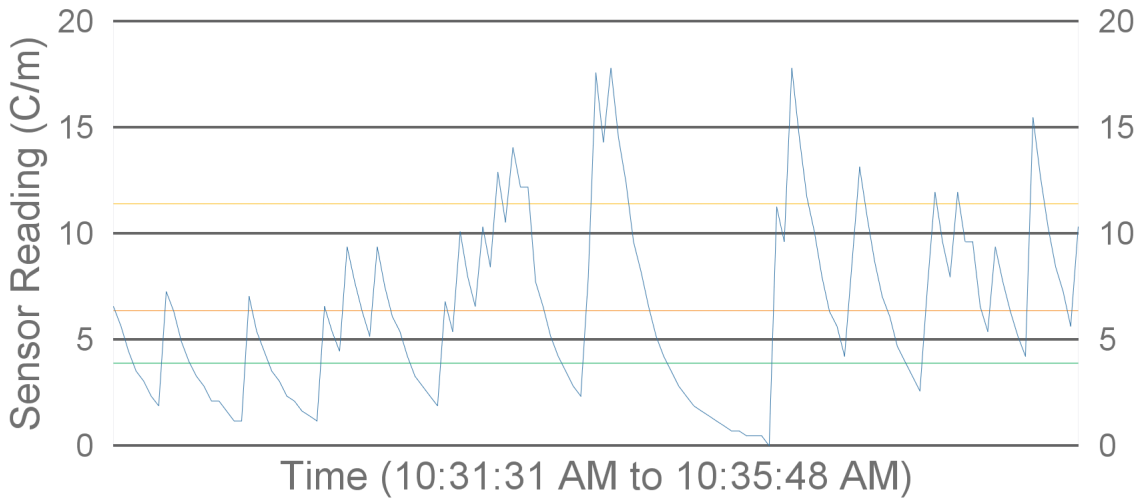


No. of Readings: 132

Max. Value	17.81	**Ave. Bckgrnd**	3.89
Min. Value	0.00	**Action Level**	11.41
Std. Deviation	4.10	**Ave. of Results**	6.37

Matrix:	Carpet
Room:	Living Room (LV) Section 2

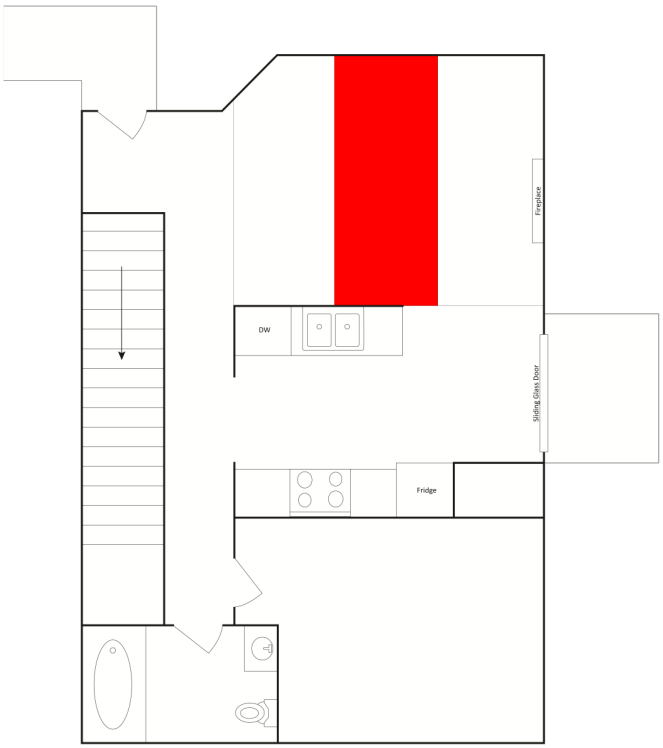
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:36:18 AM
Time Ended	10:41:40 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Carpet (beta/gamma)

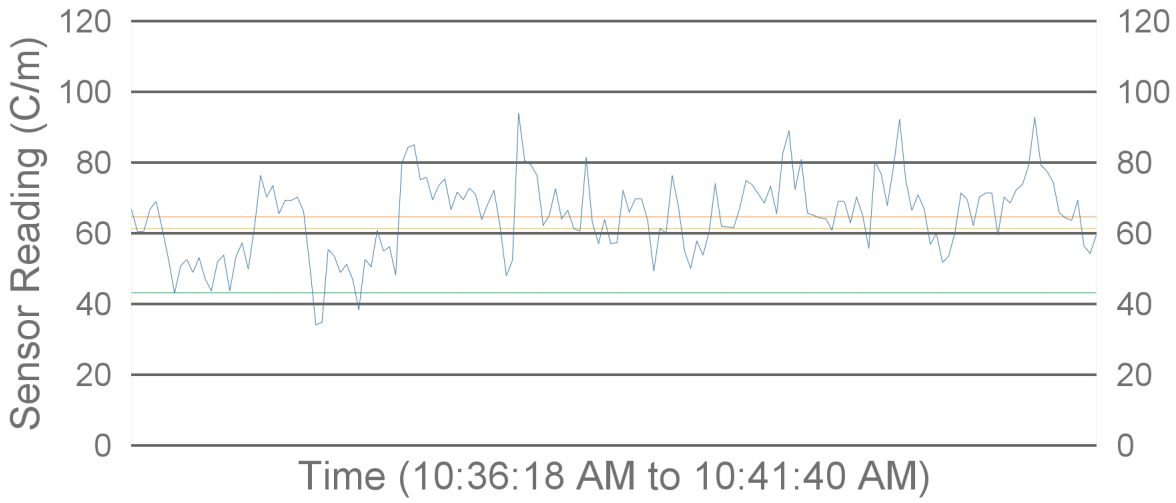


No. of Readings: 165

Max. Value	93.98	**Ave. Bckgrnd**	43.28
Min. Value	34.22	**Action Level**	61.48
Std. Deviation	11.05	**Ave. of Results**	64.71

Matrix:	Carpet
Room:	Living Room (LV) Section 2

Survey Results

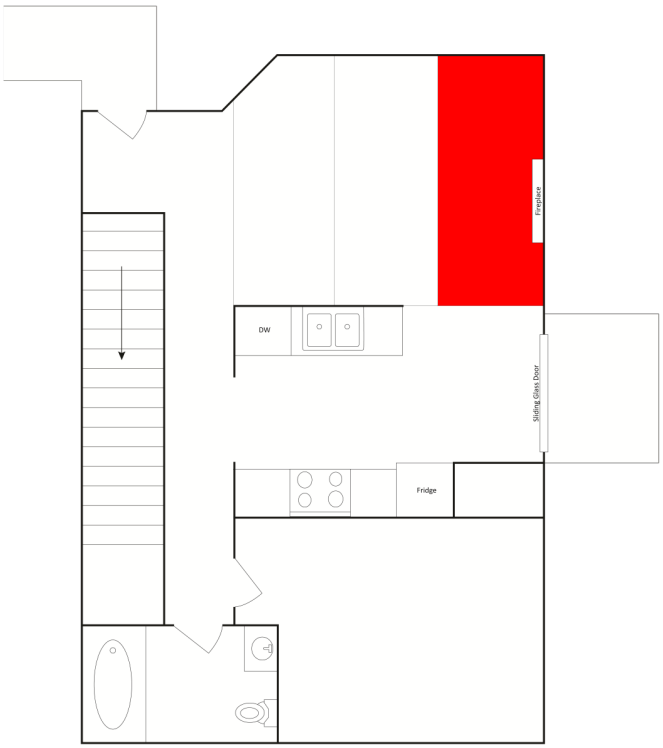


Ratemeter Model 44-9 Pancake G-M Detector (Position 4)
Action Level (61.47 C/m)
Background (43.28 C/m)
Average Readingl (64.71 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:42:46 AM
Time Ended	10:47:48 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Carpet (alpha)

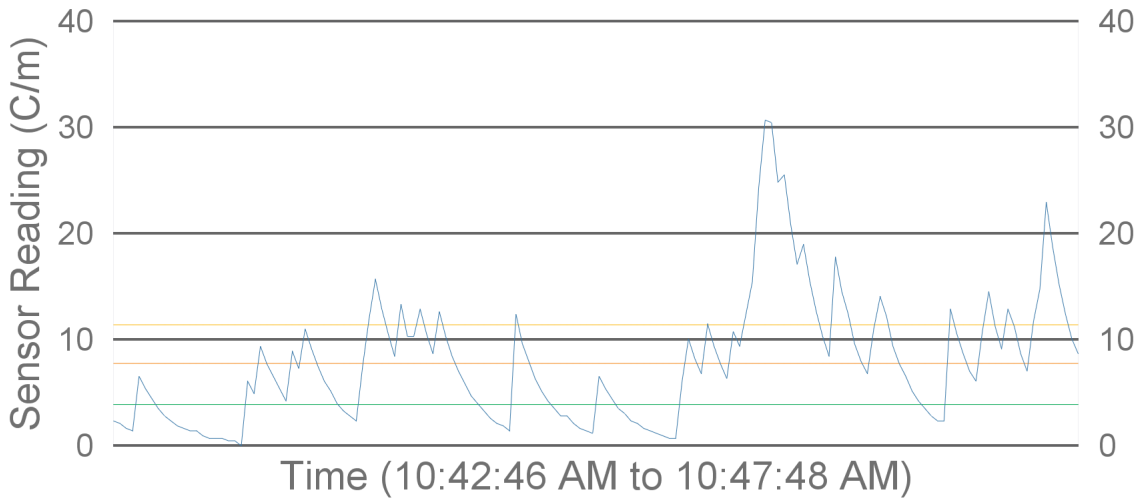


No. of Readings: 155

Max. Value	30.70	**Ave. Bckgrnd**	3.89
Min. Value	0.00	**Action Level**	11.41
Std. Deviation	6.03	**Ave. of Results**	7.76

Matrix:	Carpet
Room:	Living Room (LV) Section 3

Survey Results

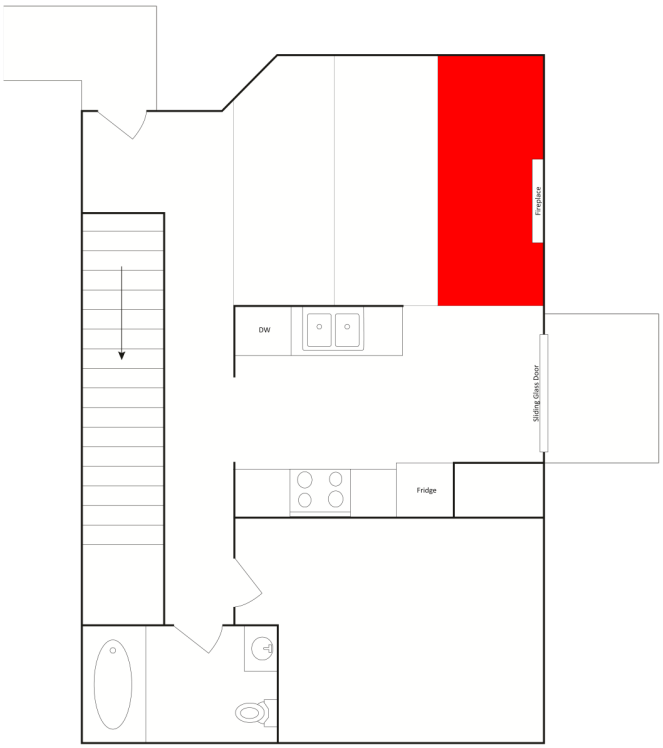


Ratemeter Model 43-90 100 cm2 Alpha Scintillator (Position 2)
Action Level (11.4 C/m)
Background (3.89 C/m)
Average Readingl (7.75 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:46:09 AM
Time Ended	10:50:01 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Carpet (beta/gamma)

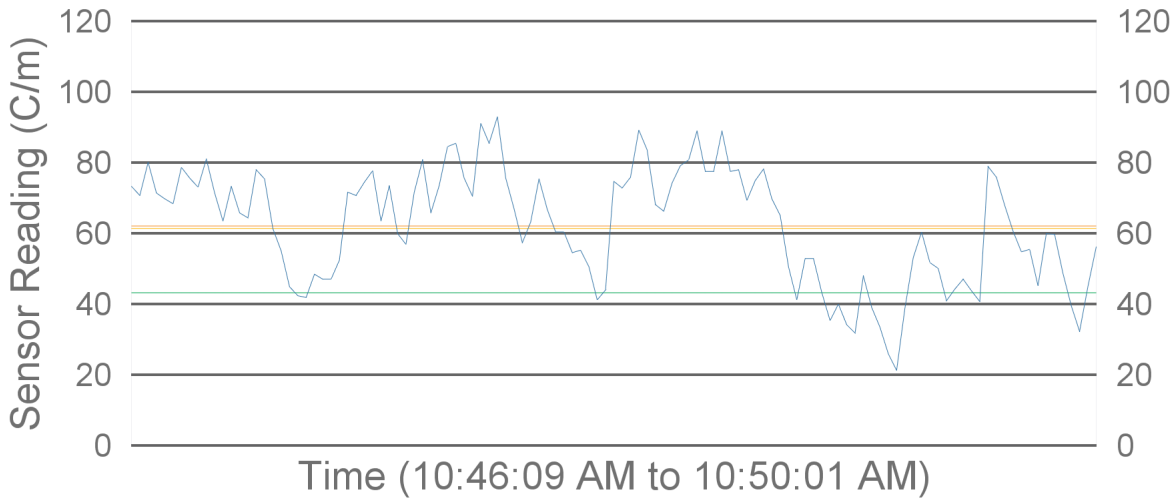


No. of Readings: 120

Max. Value	93.05	**Ave. Bckgrnd**	43.28
Min. Value	21.33	**Action Level**	61.48
Std. Deviation	16.10	**Ave. of Results**	62.15

Matrix:	Carpet
Room:	Living Room (LV) Section 3

Survey Results

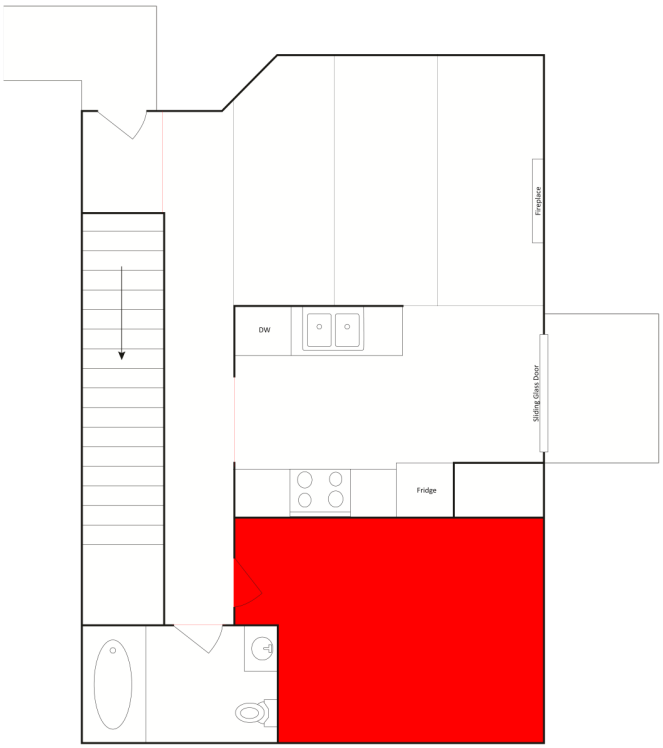


Ratemeter Model 44-9 Pancake G-M Detector (Position 4)
Action Level (61.47 C/m)
Background (43.28 C/m)
Average Readingl (62.15 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:50:25 AM
Time Ended	10:55:23 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Carpet (alpha)

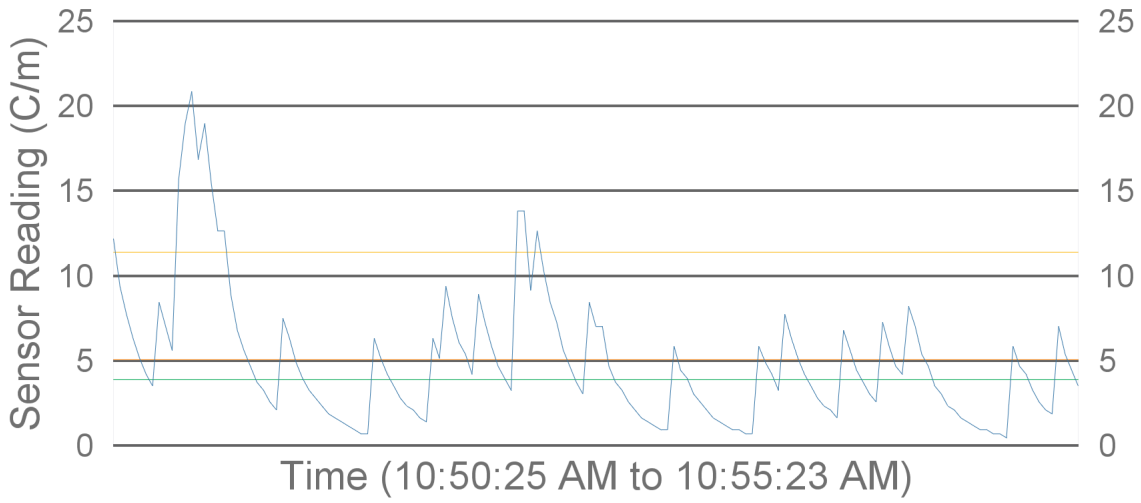


No. of Readings: 153

Max. Value	20.86	**Ave. Bckgrnd**	3.89
Min. Value	0.47	**Action Level**	11.41
Std. Deviation	3.98	**Ave. of Results**	5.07

Matrix:	Carpet
Room:	First Floor Bedroom (BA)

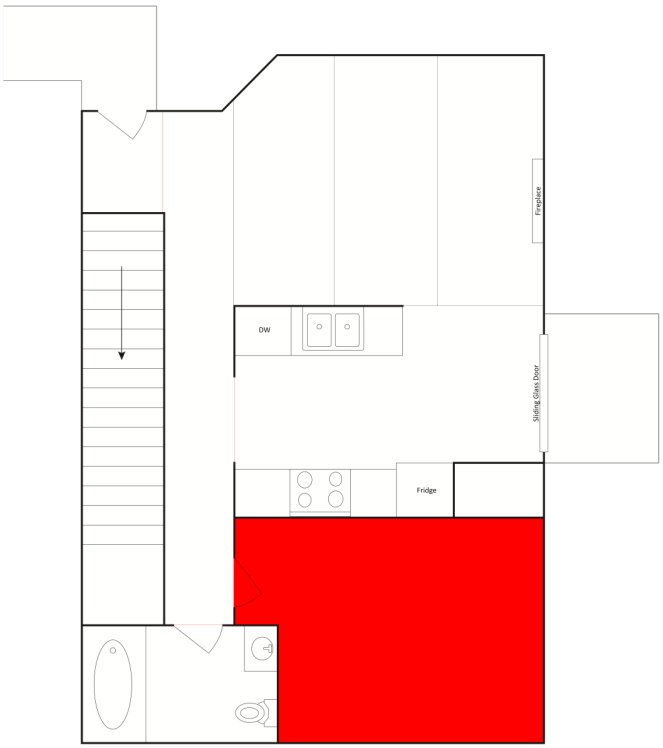
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:52:15 AM
Time Ended	10:58:22 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Carpet (beta/gamma)

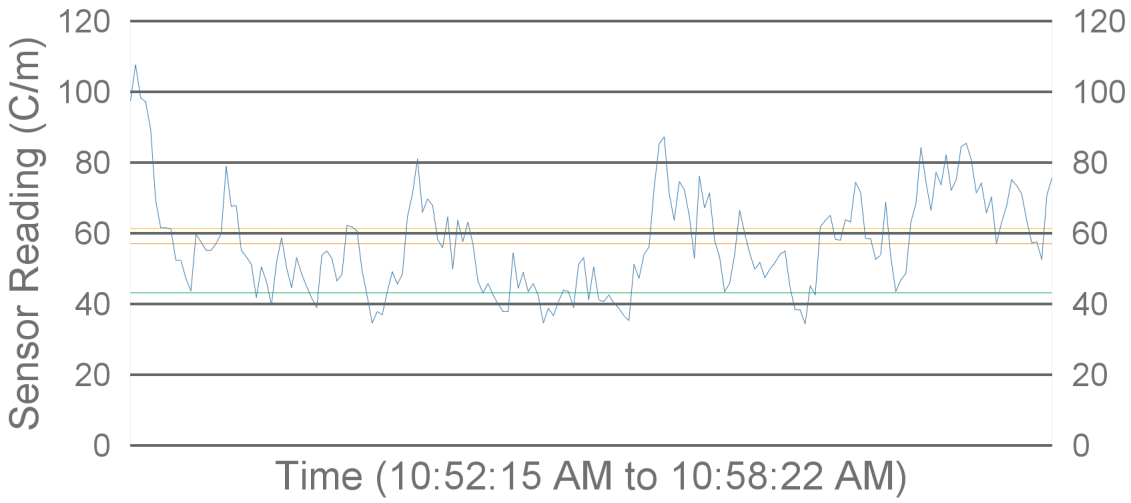


No. of Readings: 188

Max. Value	107.81	**Ave. Bckgrnd**	43.28
Min. Value	34.45	**Action Level**	61.48
Std. Deviation	14.25	**Ave. of Results**	57.13

Matrix:	Carpet
Room:	First Floor Bedroom (BA)

Survey Results

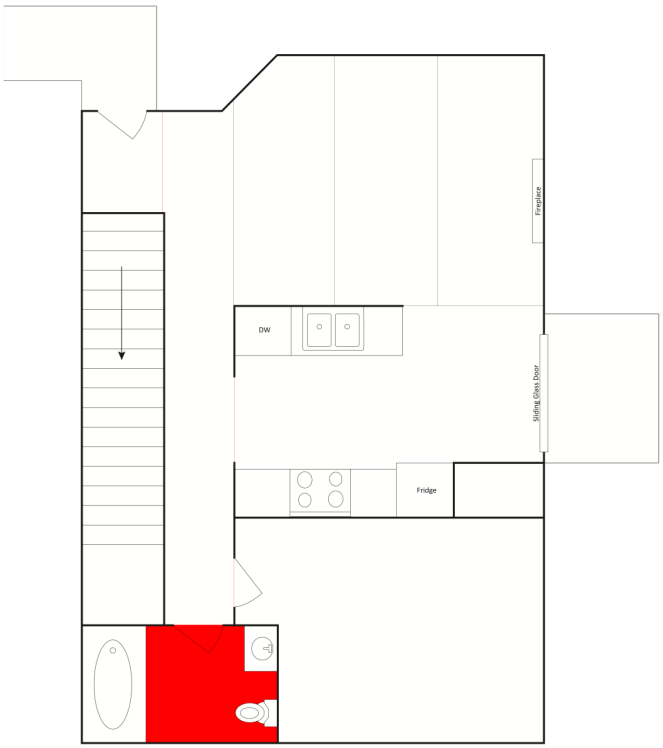


Ratemeter Model 44-9 Pancake G-M Detector (Position 4)
Action Level (61.47 C/m)
Background (43.28 C/m)
Average Readingl (57.13 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:56:05 AM
Time Ended	10:58:14 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

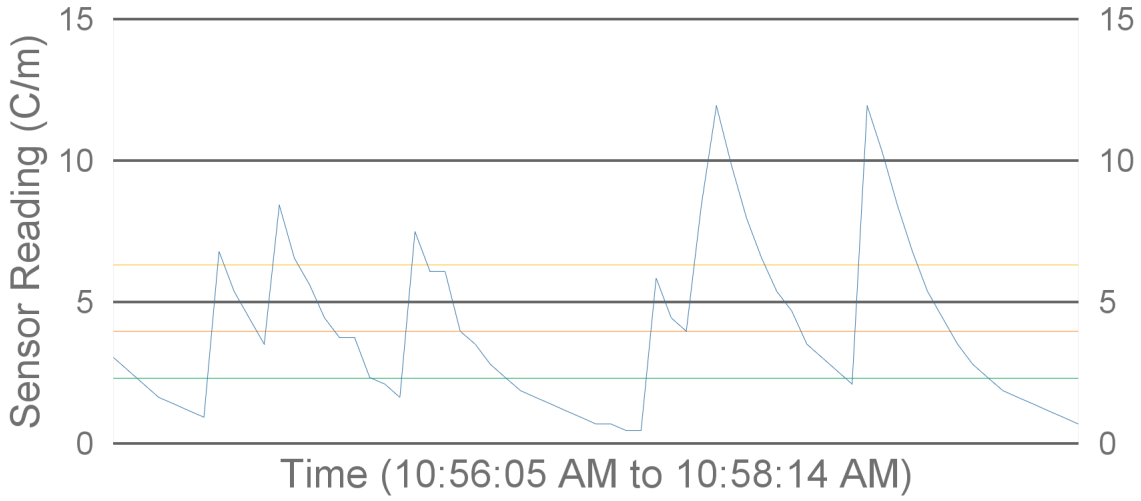


No. of Readings: 67

Max. Value	11.95	**Ave. Bckgrnd**	2.32
Min. Value	0.47	**Action Level**	6.32
Std. Deviation	2.83	**Ave. of Results**	3.97

Matrix:	Linoleum
Room:	First Floor Bathroom (RA)

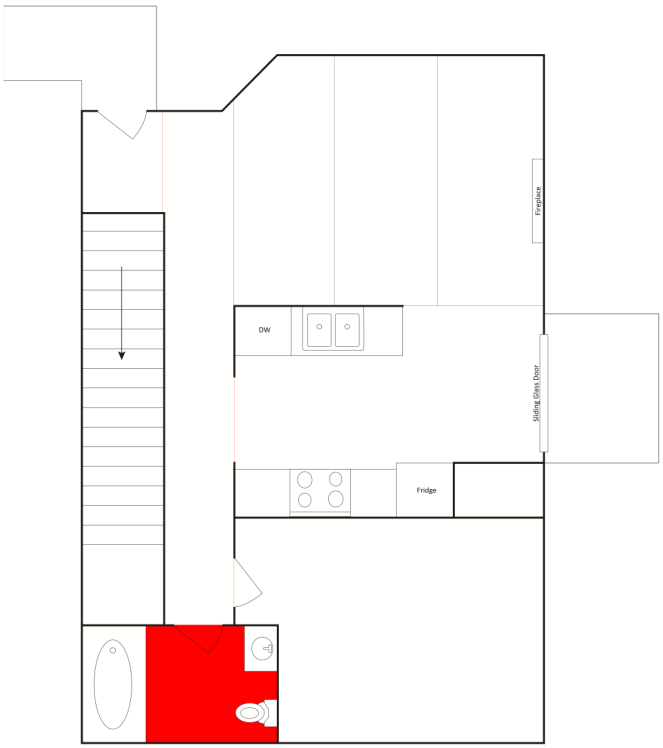
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	10:58:49 AM
Time Ended	11:01:02 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

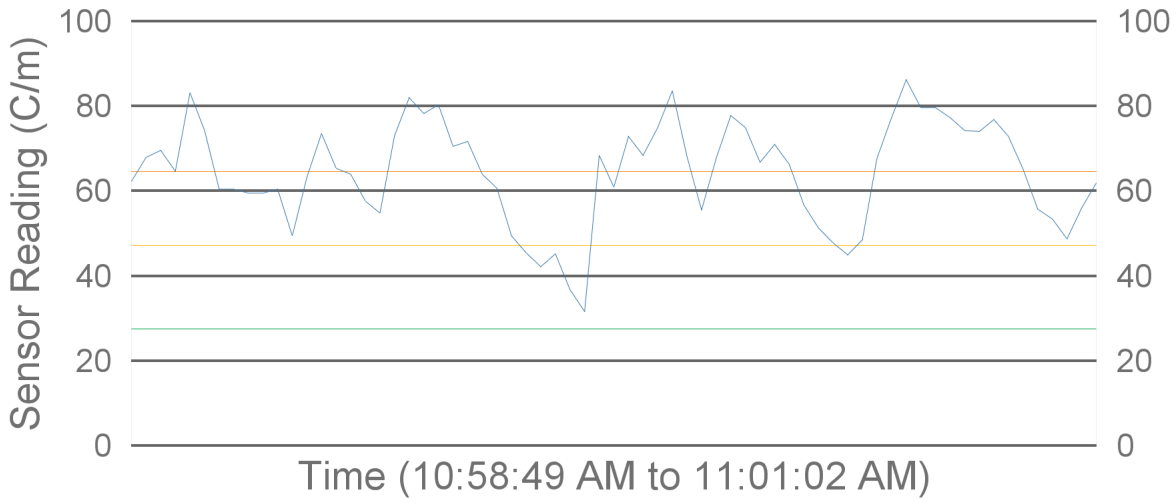


No. of Readings: 68

Max. Value	86.25	**Ave. Bckgrnd**	27.56
Min. Value	31.64	**Action Level**	47.19
Std. Deviation	12.11	**Ave. of Results**	64.62

Matrix:	Linoleum
Room:	First Floor Bathroom (RA)

Survey Results

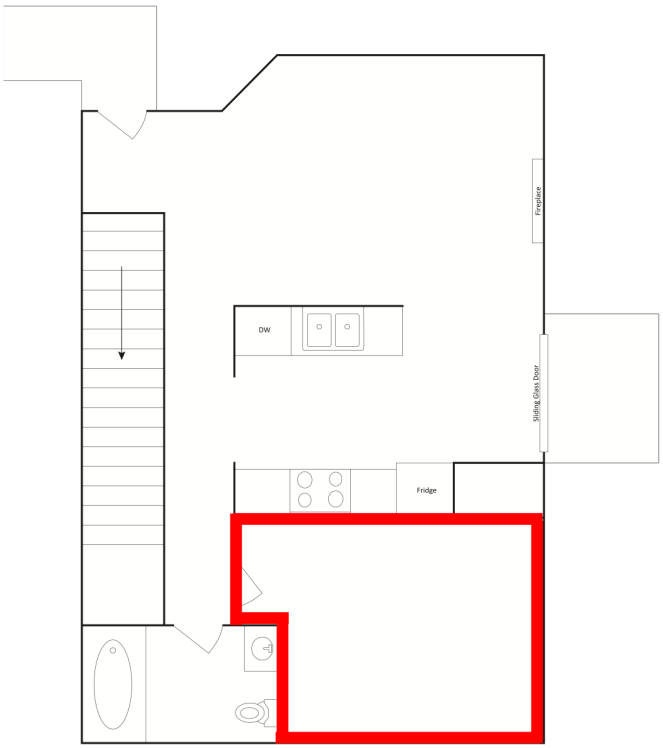


Ratemeter Model 44-9 Pancake G-M Detector (Position 4)
Action Level (47.18 C/m)
Background (27.55 C/m)
Average Readingl (64.61 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	11:04:51 AM
Time Ended	11:15:37 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

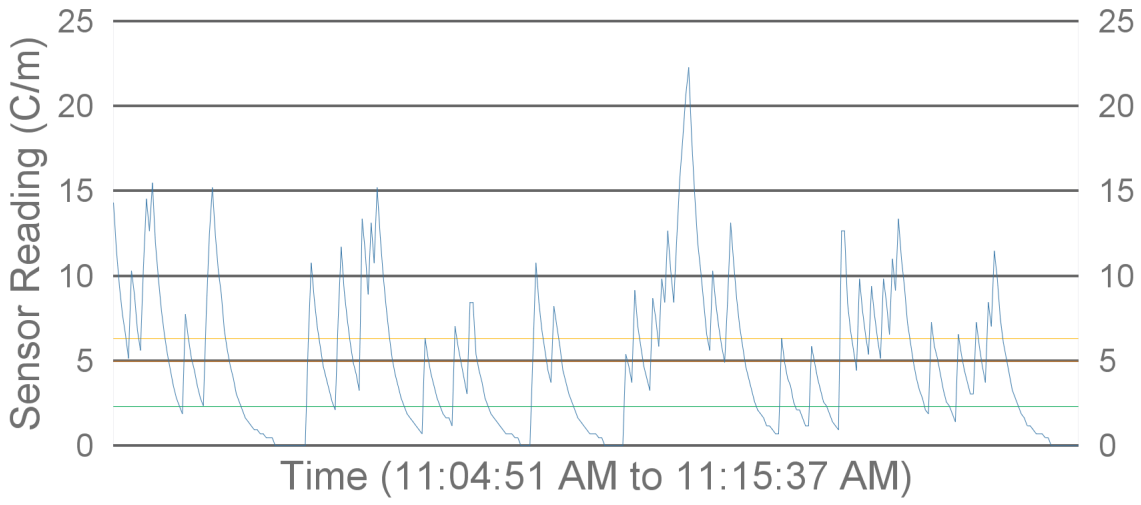


No. of Readings: 330

Max. Value	22.27	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	4.22	**Ave. of Results**	4.97

Matrix:	Wall
Room:	First Floor Bedroom (BA)

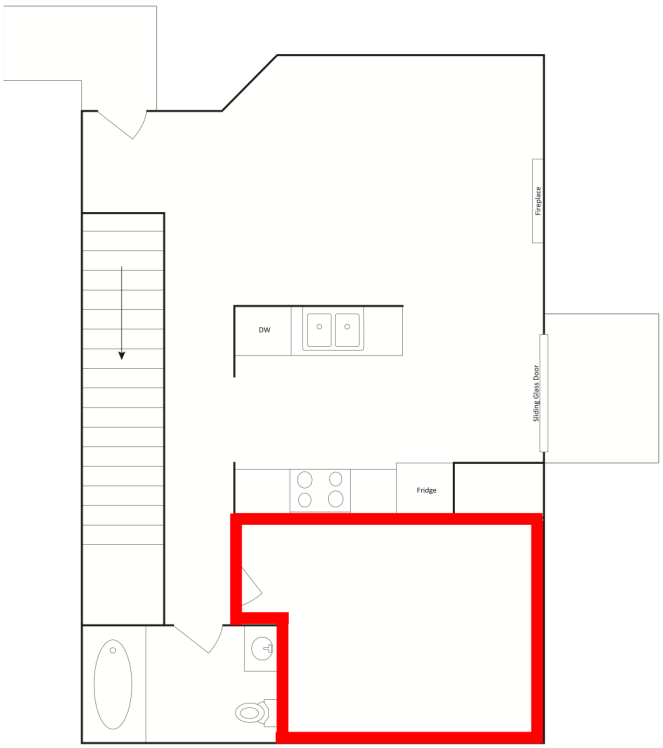
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	11:07:26 AM
Time Ended	11:18:02 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

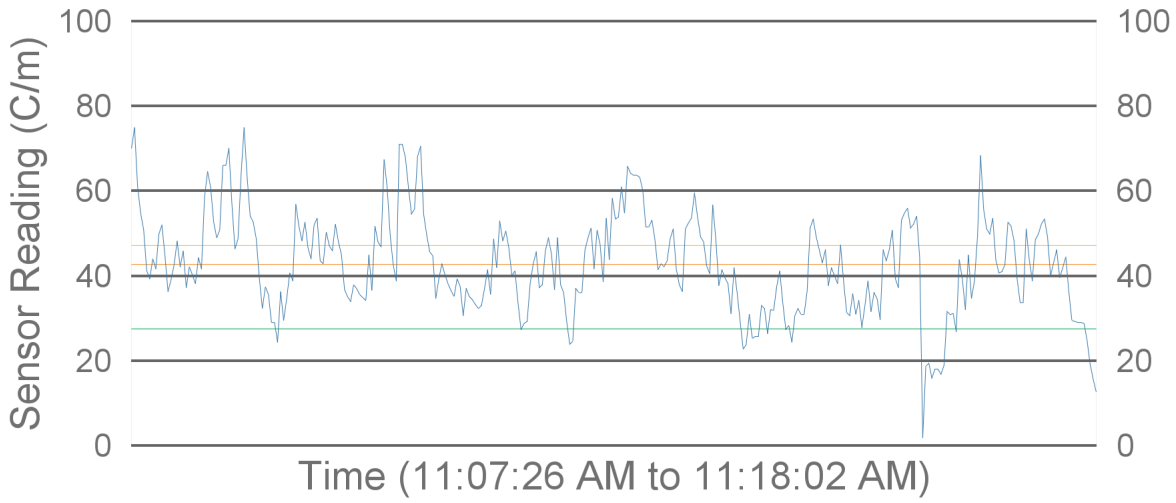


No. of Readings: 326

Max. Value	75.00	**Ave. Bckgrnd**	27.56
Min. Value	1.88	**Action Level**	47.19
Std. Deviation	12.07	**Ave. of Results**	42.75

Matrix:	Wall
Room:	First Floor Bedroom (BA)

Survey Results

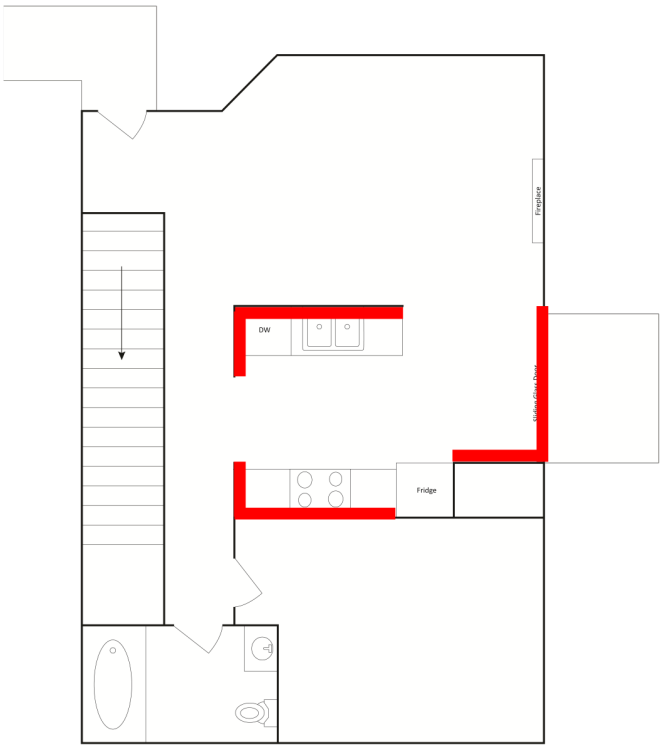


Ratemeter Model 44-9 Pancake G-M Detector (Position 4)
Action Level (47.18 C/m)
Background (27.55 C/m)
Average Readingl (42.74 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	11:17:36 AM
Time Ended	11:21:54 AM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

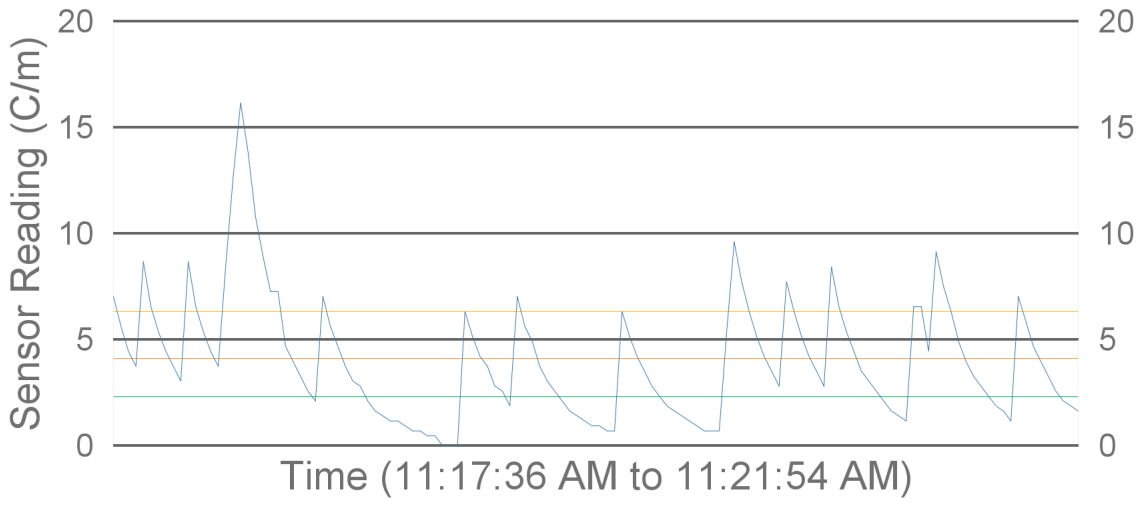


No. of Readings: 133

Max. Value	16.17	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	2.88	**Ave. of Results**	4.12

Matrix:	Wall
Room:	Kitchen (KN)

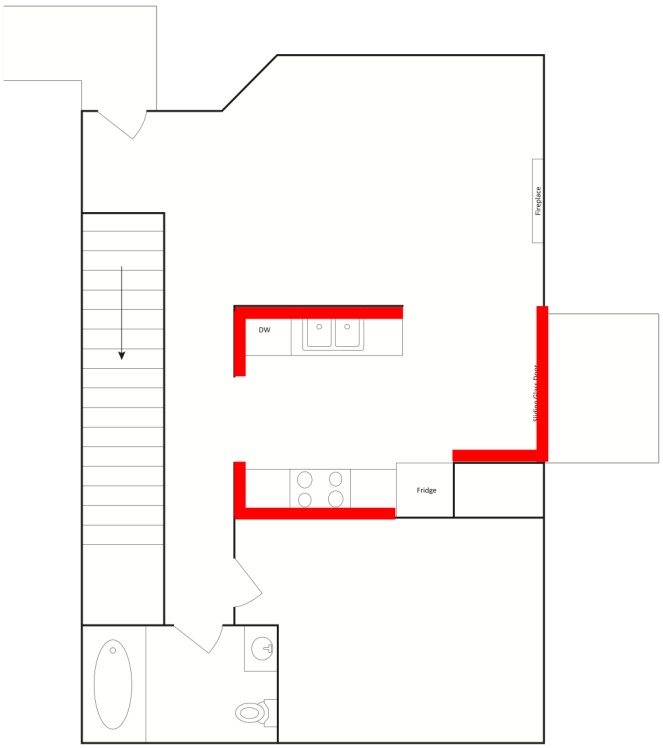
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	11:19:31 AM
Time Ended	11:22:53 AM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

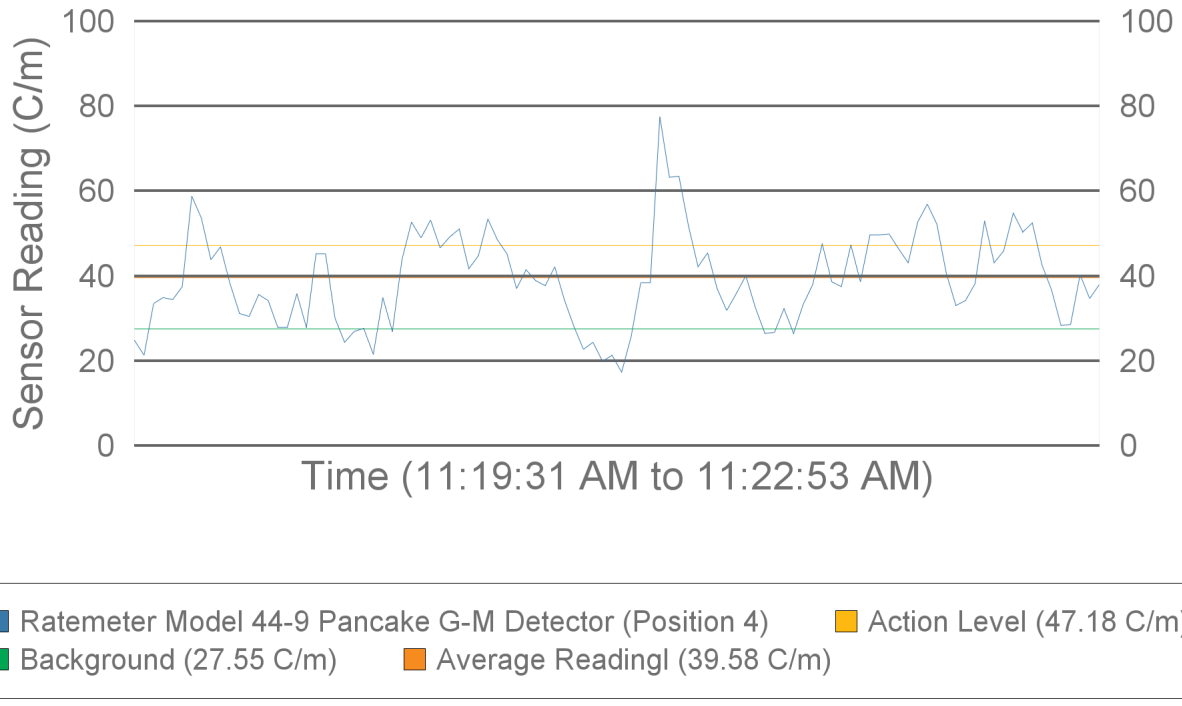


No. of Readings: 105

Max. Value	77.58	**Ave. Bckgrnd**	27.56
Min. Value	17.34	**Action Level**	47.19
Std. Deviation	10.97	**Ave. of Results**	39.59

Matrix:	Wall
Room:	Kitchen (KN)

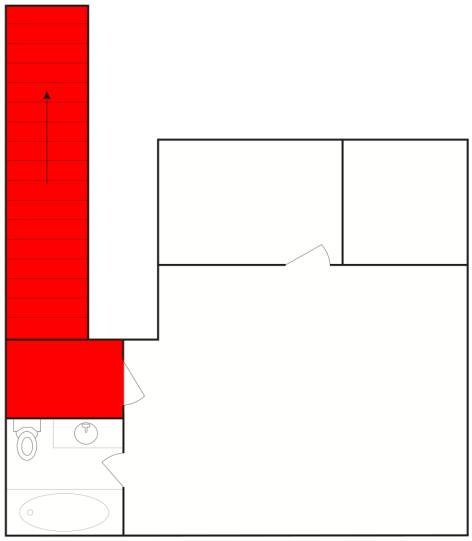
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	12:23:56 PM
Time Ended	12:30:39 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Carpet (alpha)

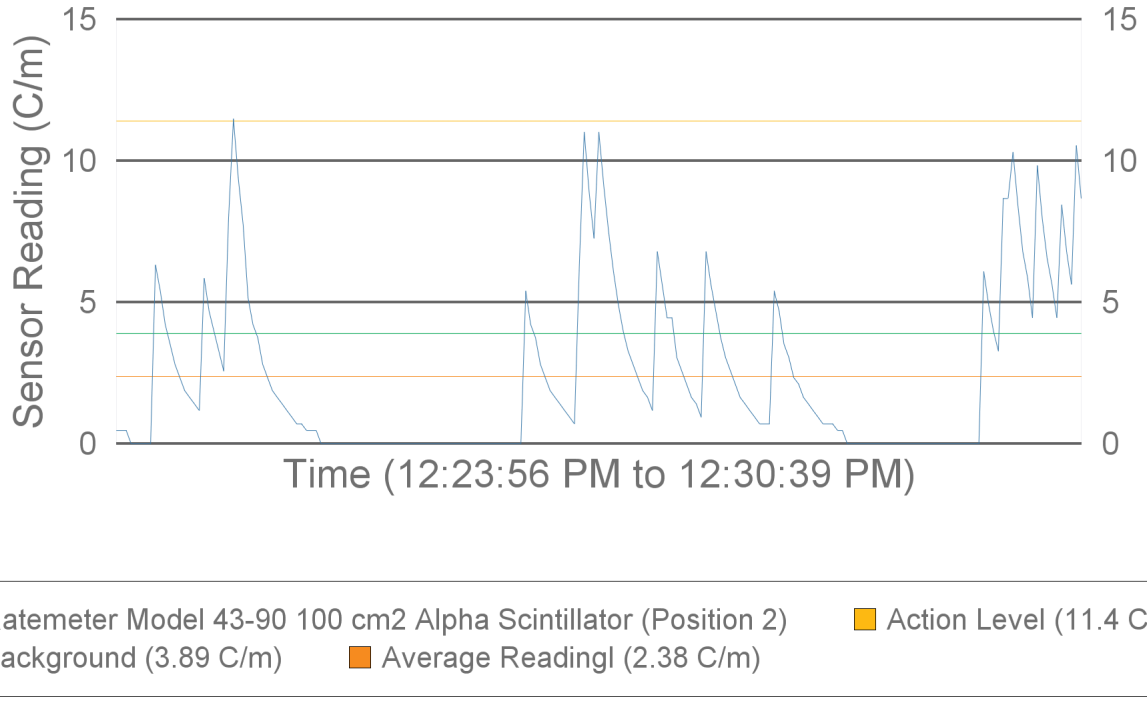


No. of Readings: 206

Max. Value	11.48	**Ave. Bckgrnd**	3.89
Min. Value	0.00	**Action Level**	11.41
Std. Deviation	2.96	**Ave. of Results**	2.38

Matrix:	Carpet
Room:	Stairs

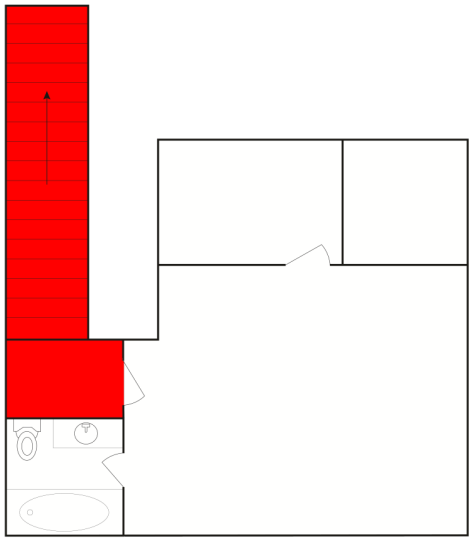
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	12:53:01 PM
Time Ended	1:16:08 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Carpet (beta/gamma)

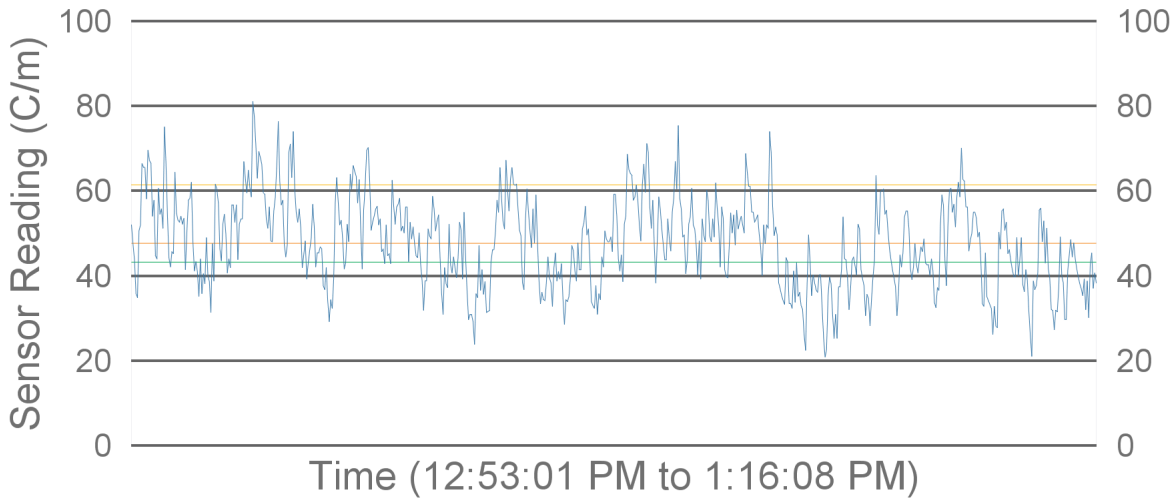


No. of Readings: 665

Max. Value	81.09	**Ave. Bckgrnd**	43.28
Min. Value	20.86	**Action Level**	61.48
Std. Deviation	10.59	**Ave. of Results**	47.71

Matrix:	Carpet
Room:	Stairs

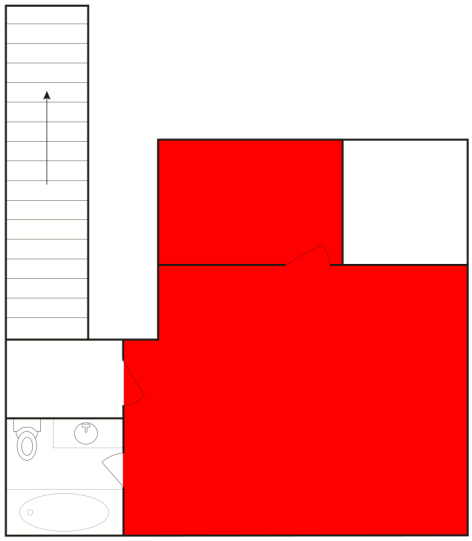
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	12:31:26 PM
Time Ended	12:39:46 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Carpet (alpha)

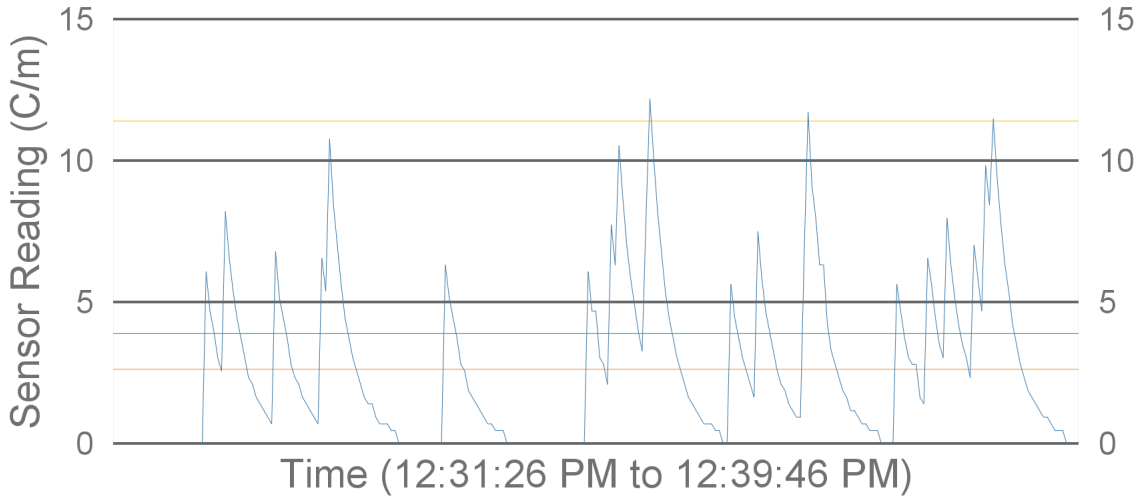


No. of Readings: 258

Max. Value	12.19	**Ave. Bckgrnd**	3.89
Min. Value	0.00	**Action Level**	11.41
Std. Deviation	2.81	**Ave. of Results**	2.63

Matrix:	Carpet
Room:	Second Floor Bedroom (BB)

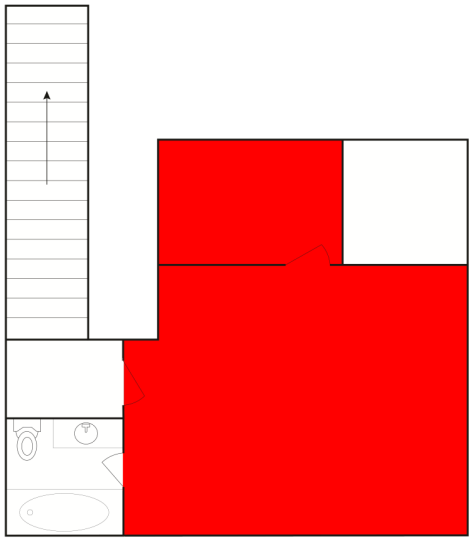
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	1:17:31 PM
Time Ended	1:33:06 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Carpet (beta/gamma)

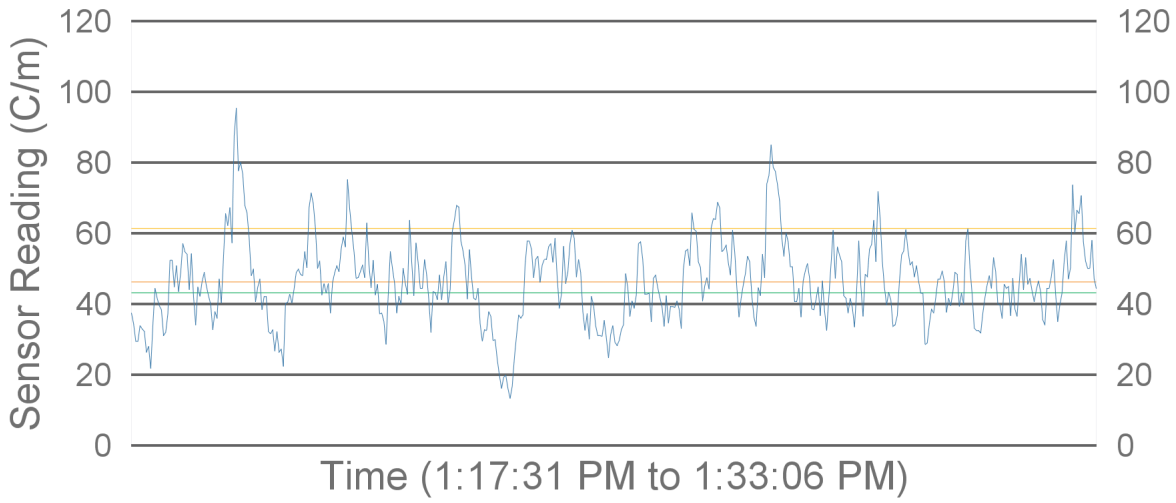


No. of Readings: 463

Max. Value	95.39	**Ave. Bckgrnd**	43.28
Min. Value	13.36	**Action Level**	61.48
Std. Deviation	11.67	**Ave. of Results**	46.33

Matrix:	Carpet
Room:	Second Floor Bedroom (BB)

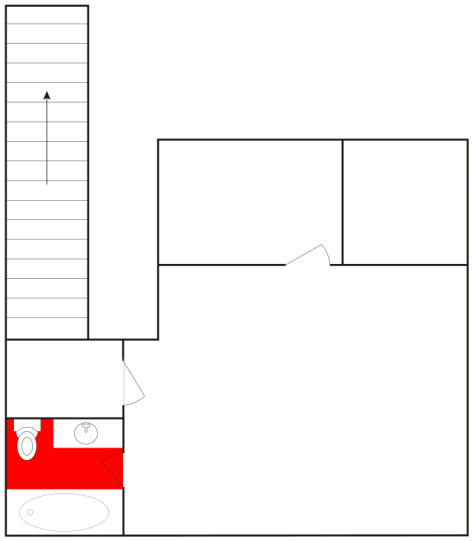
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	12:53:18 PM
Time Ended	12:55:54 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

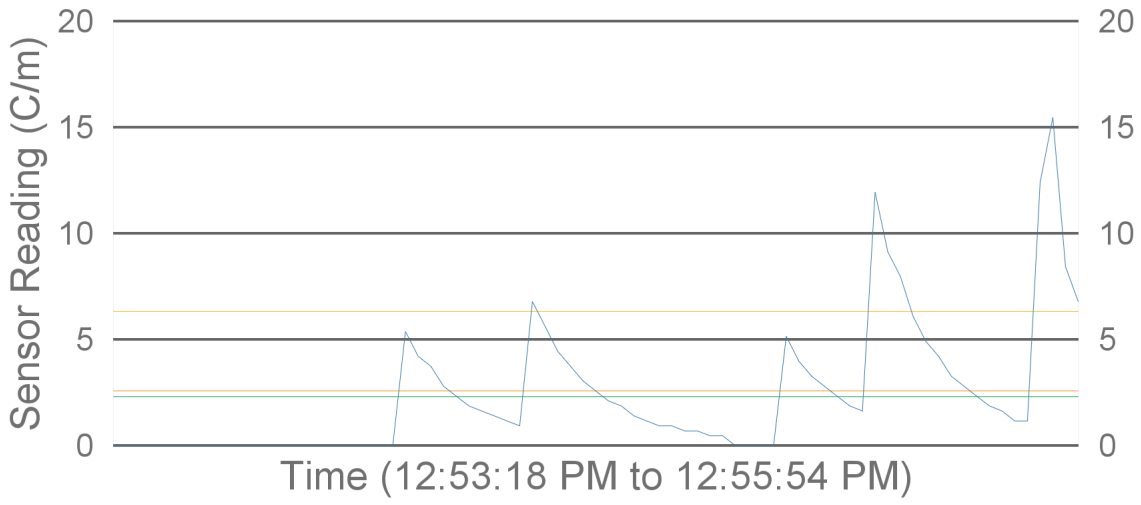


No. of Readings: 81

Max. Value	15.47	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	3.44	**Ave. of Results**	2.59

Matrix:	Linoleum
Room:	Second Floor Bathroom (RB)

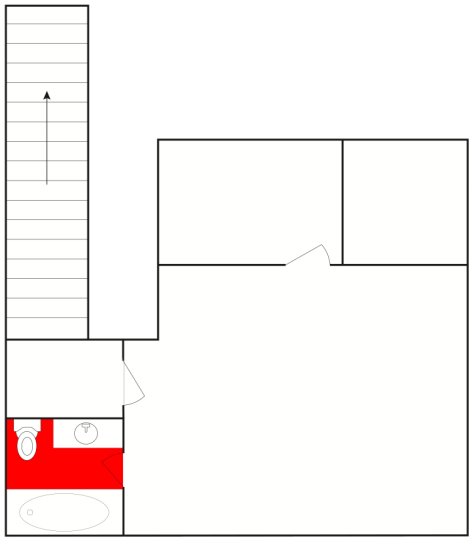
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	1:34:25 PM
Time Ended	1:38:40 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

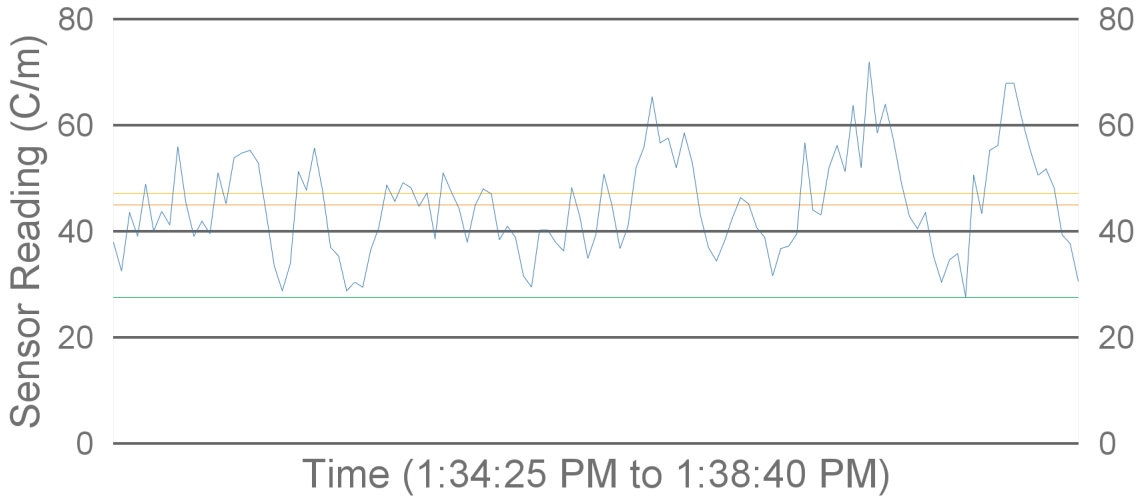


No. of Readings: 124

Max. Value	71.95	**Ave. Bckgrnd**	27.56
Min. Value	27.66	**Action Level**	47.19
Std. Deviation	9.37	**Ave. of Results**	45.02

Matrix:	Linoleum
Room:	Second Floor Bathroom (RB)

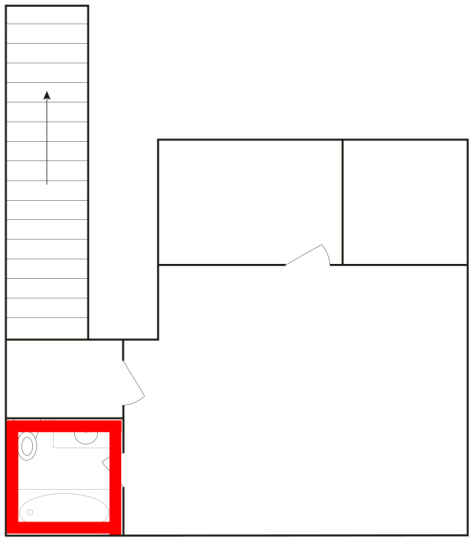
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	1:14:39 PM
Time Ended	1:18:03 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

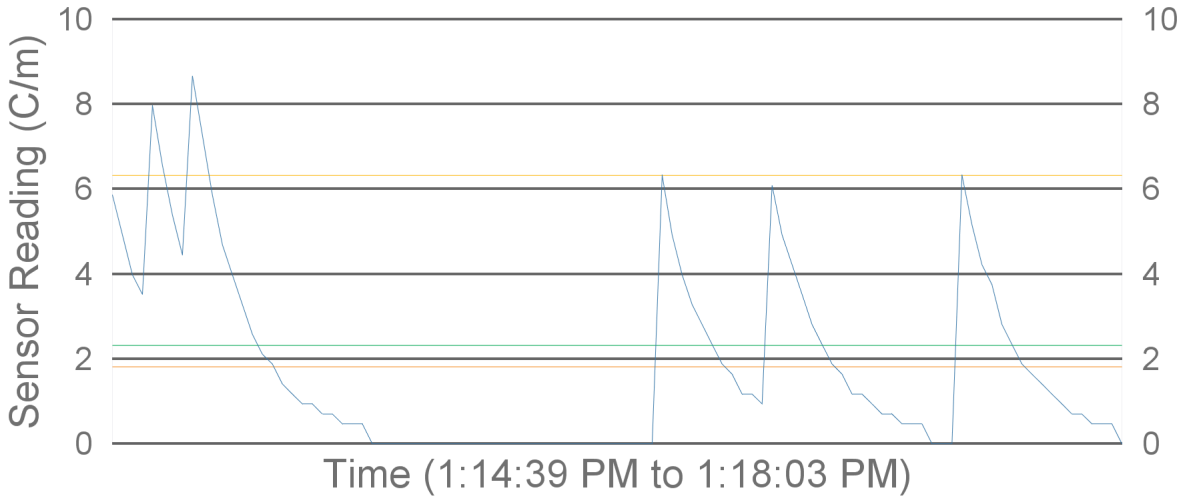


No. of Readings: 104

Max. Value	8.67	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	2.17	**Ave. of Results**	1.81

Matrix:	Wall
Room:	Second Floor Bathroom (RB)

Survey Results

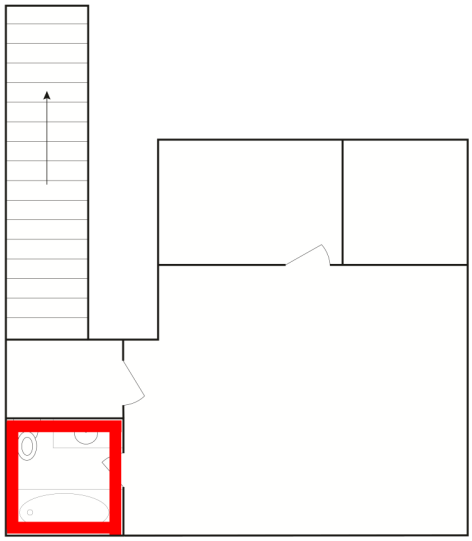


Ratemeter Model 43-90 100 cm2 Alpha Scintillator (Position 2)
Action Level (6.32 C/m)
Background (2.31 C/m)
Average Readingl (1.81 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	1:43:07 PM
Time Ended	1:46:16 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

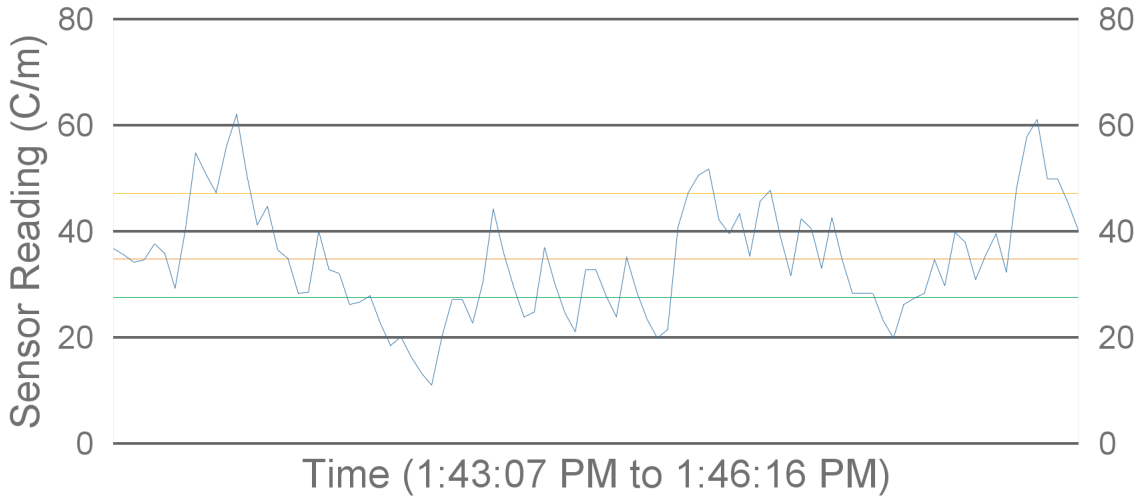


No. of Readings: 98

Max. Value	62.11	**Ave. Bckgrnd**	27.56
Min. Value	11.02	**Action Level**	47.19
Std. Deviation	10.63	**Ave. of Results**	34.83

Matrix:	Wall
Room:	Second Floor Bathroom (RB)

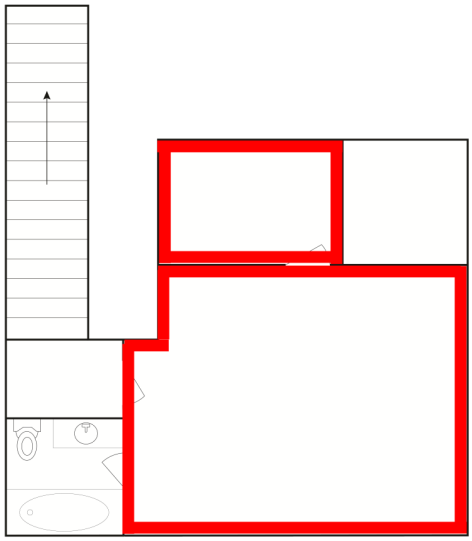
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	1:28:46 PM
Time Ended	1:54:50 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

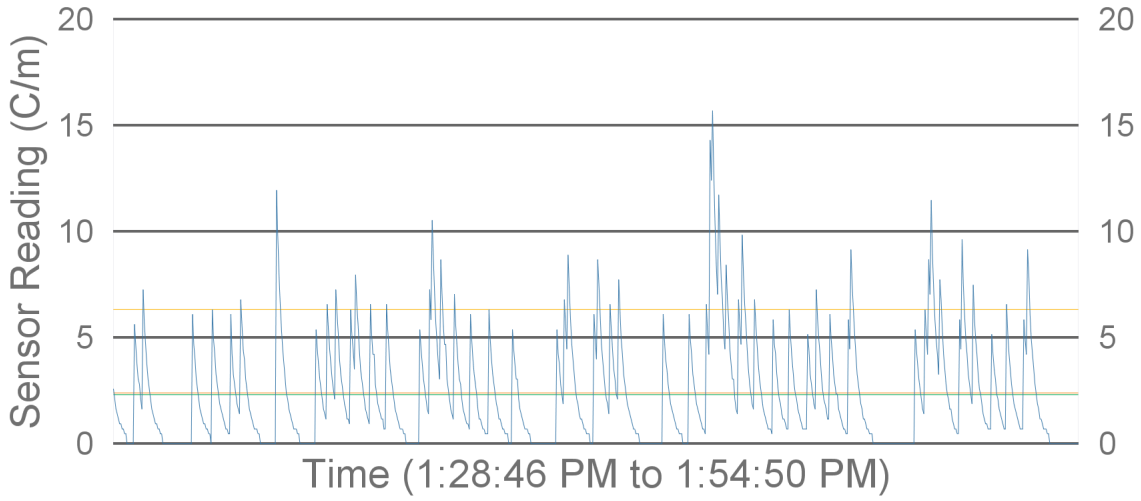


No. of Readings: 801

Max. Value	15.70	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	2.52	**Ave. of Results**	2.40

Matrix:	Wall
Room:	Second Floor Bedroom (BB)

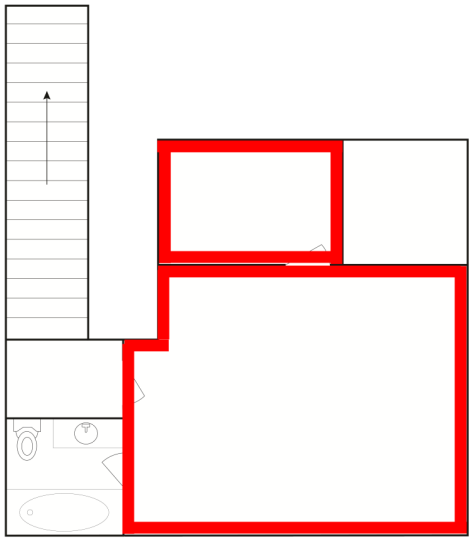
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	1:46:49 PM
Time Ended	2:09:44 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

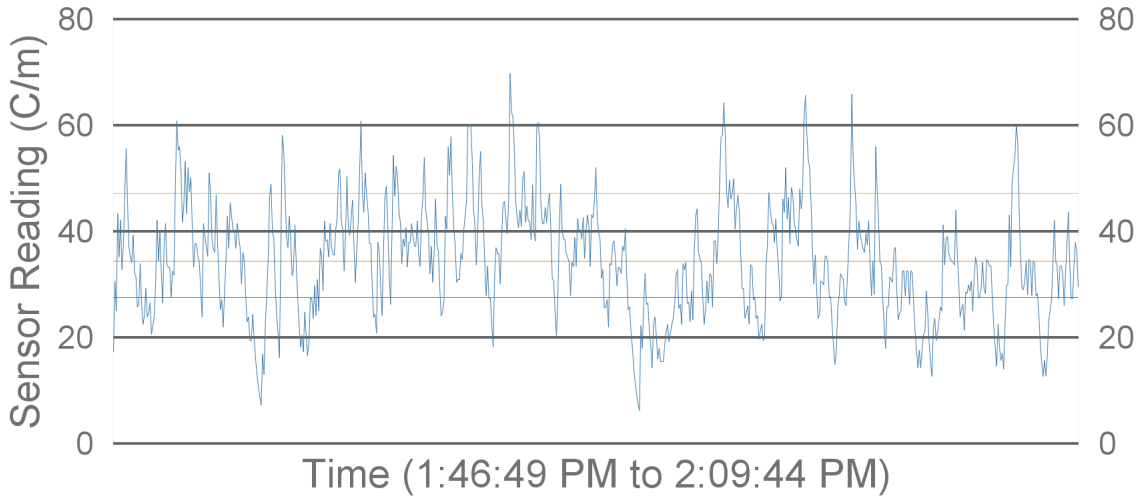


No. of Readings: 706

Max. Value	69.84	**Ave. Bckgrnd**	27.56
Min. Value	6.33	**Action Level**	47.19
Std. Deviation	10.77	**Ave. of Results**	34.40

Matrix:	Wall
Room:	Second Floor Bedroom (BB)

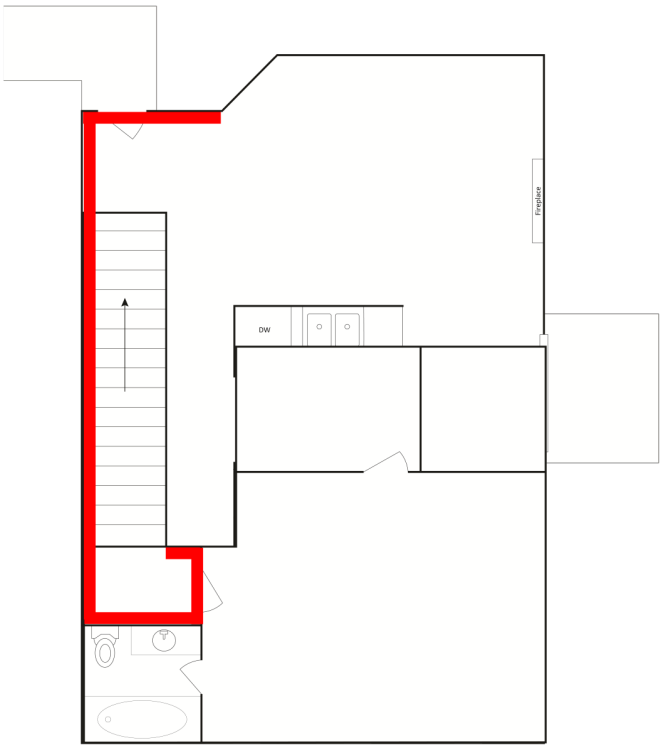
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	2:10:19 PM
Time Ended	2:31:21 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

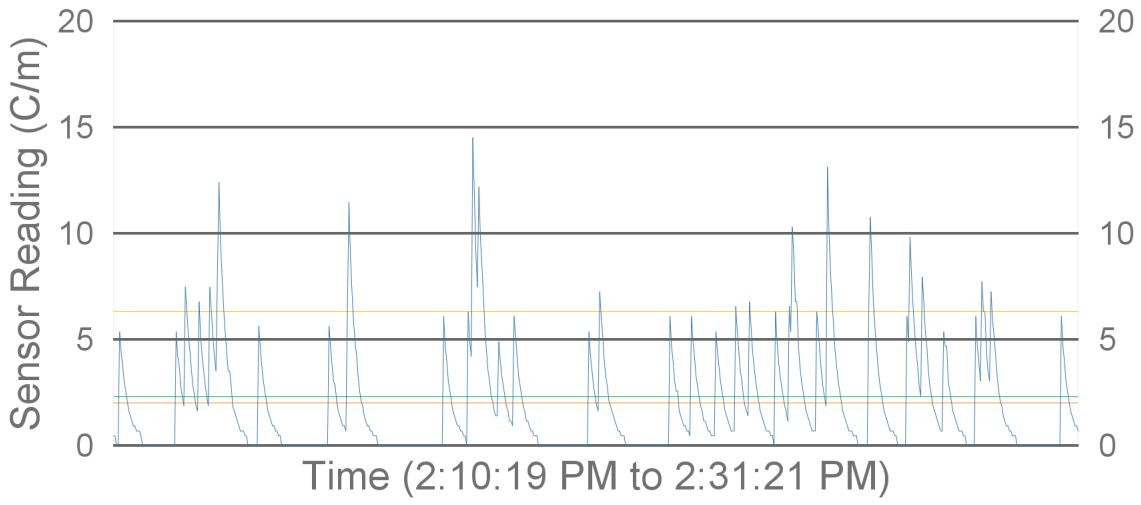


No. of Readings: 647

Max. Value	14.53	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	2.53	**Ave. of Results**	2.02

Matrix:	Wall
Room:	Stairs

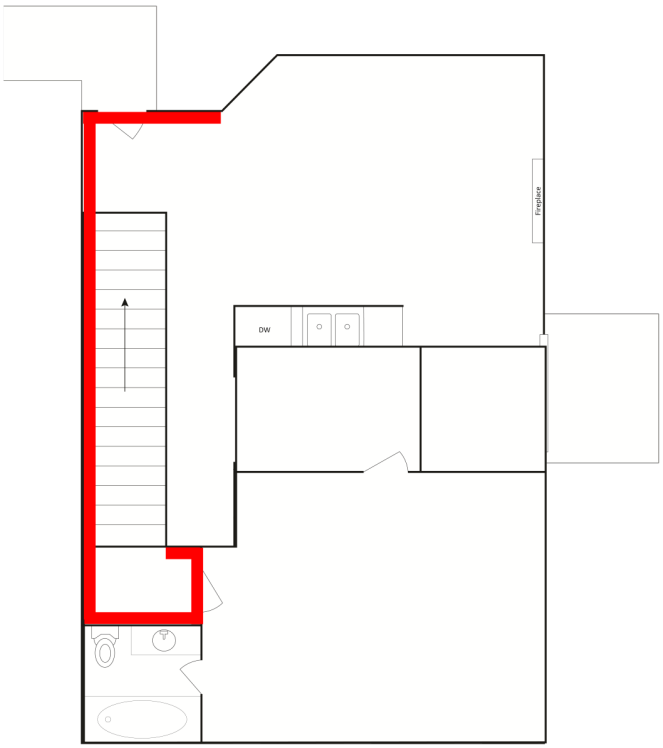
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	2:14:19 PM
Time Ended	2:43:31 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

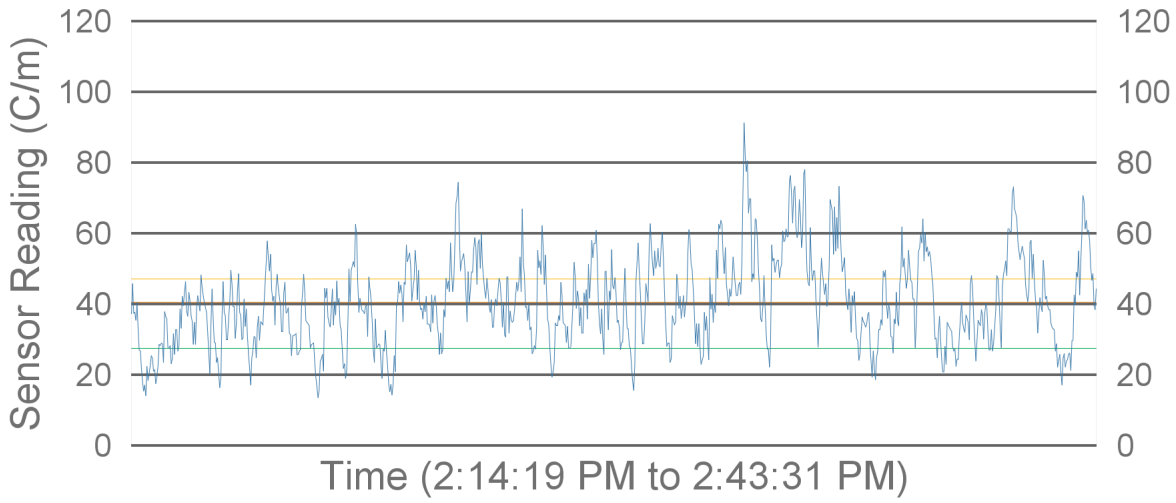


No. of Readings: 897

Max. Value	91.41	**Ave. Bckgrnd**	27.56
Min. Value	13.59	**Action Level**	47.19
Std. Deviation	12.52	**Ave. of Results**	40.61

Matrix:	Wall
Room:	Stairs

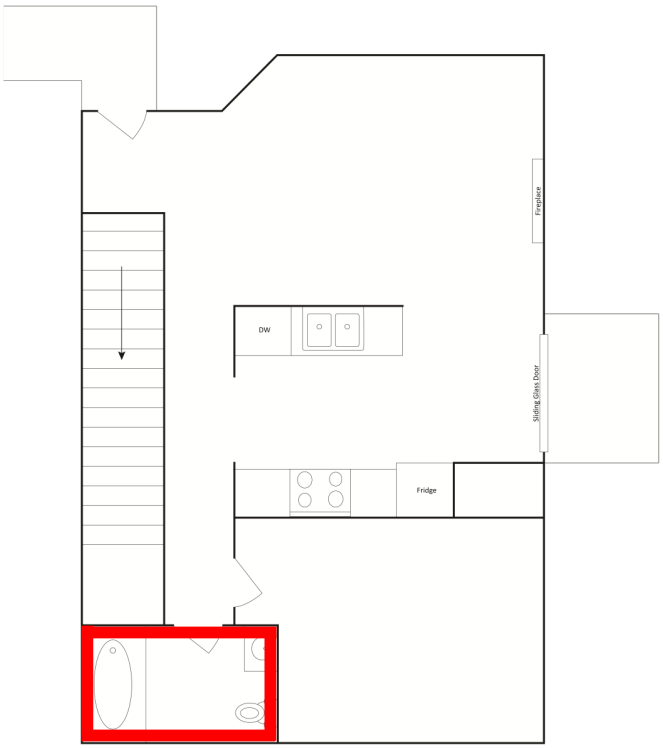
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	2:46:29 PM
Time Ended	2:52 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

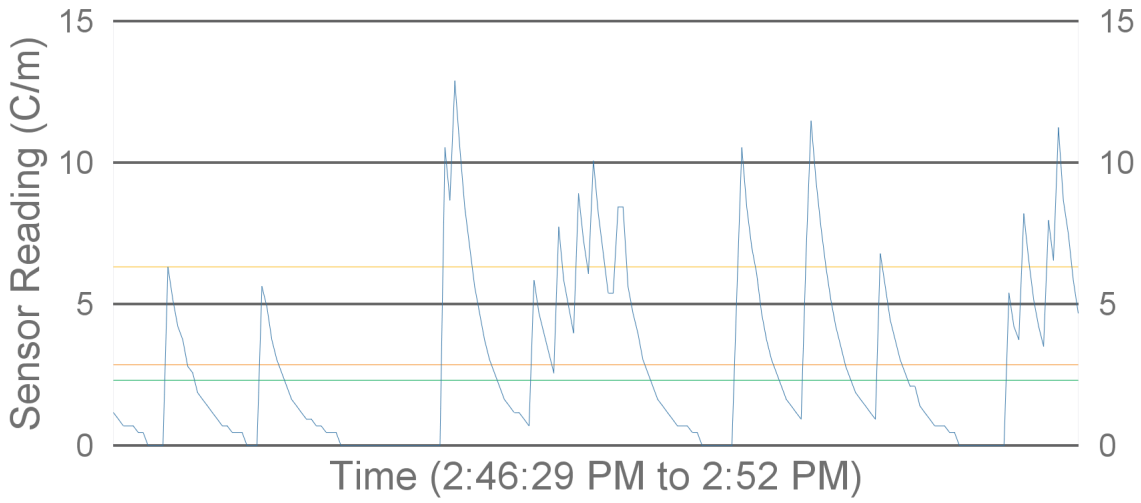


No. of Readings: 199

Max. Value	12.89	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	3.04	**Ave. of Results**	2.87

Matrix:	Wall
Room:	First Floor Bathroom (RA)

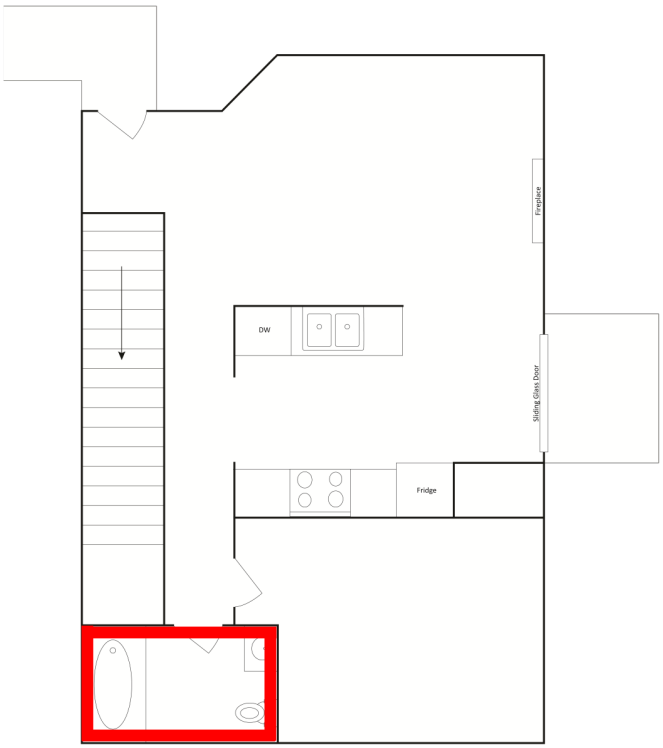
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	2:52:43 PM
Time Ended	2:59:17 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

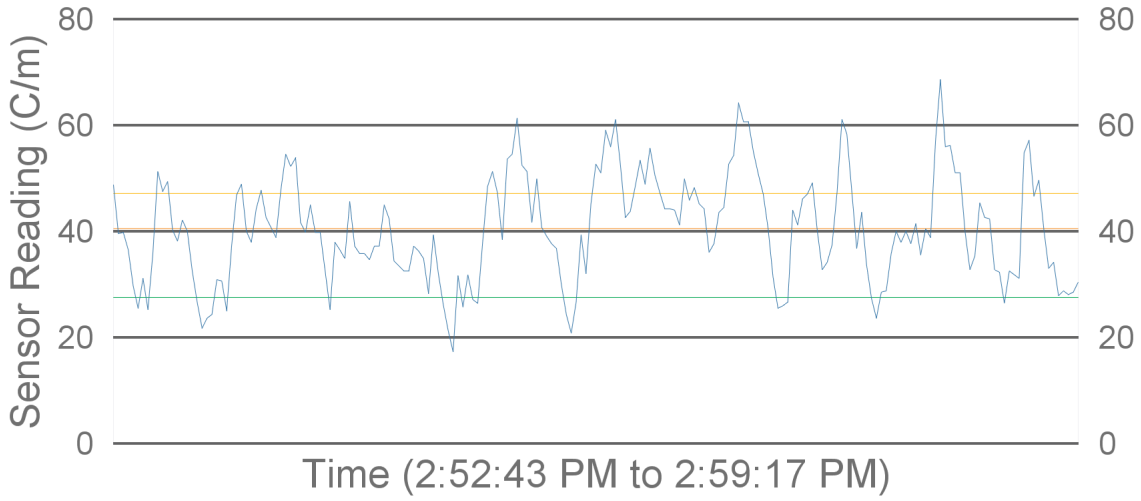


No. of Readings: 202

Max. Value	68.67	**Ave. Bckgrnd**	27.56
Min. Value	17.34	**Action Level**	47.19
Std. Deviation	9.98	**Ave. of Results**	40.57

Matrix:	Wall
Room:	First Floor Bathroom (RA)

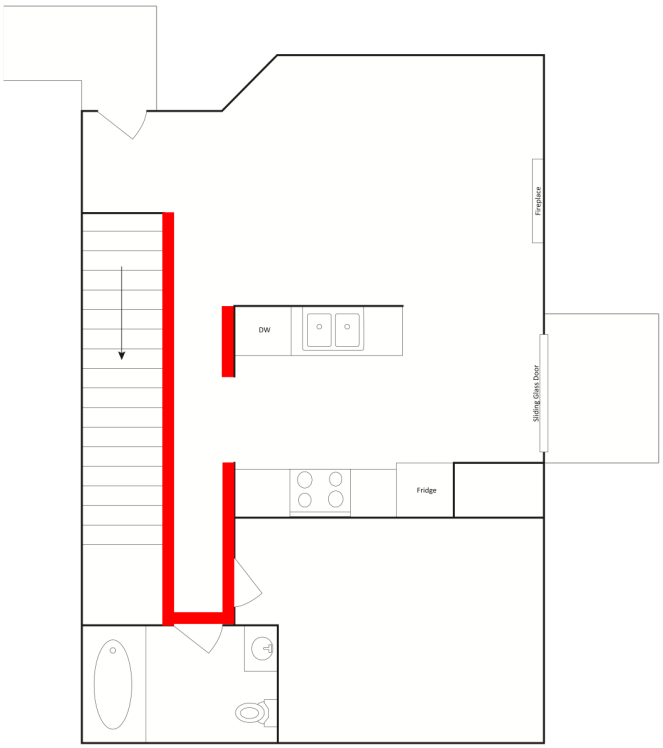
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	2:53:10 PM
Time Ended	3:05:40 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

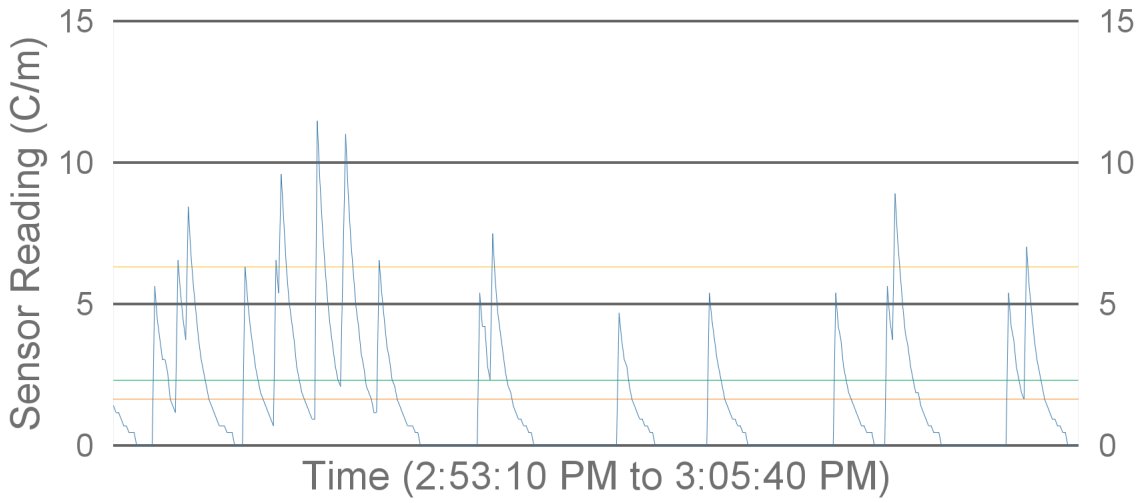


No. of Readings: 385

Max. Value	11.48	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	2.24	**Ave. of Results**	1.65

Matrix:	Wall
Room:	First Floor Hallway

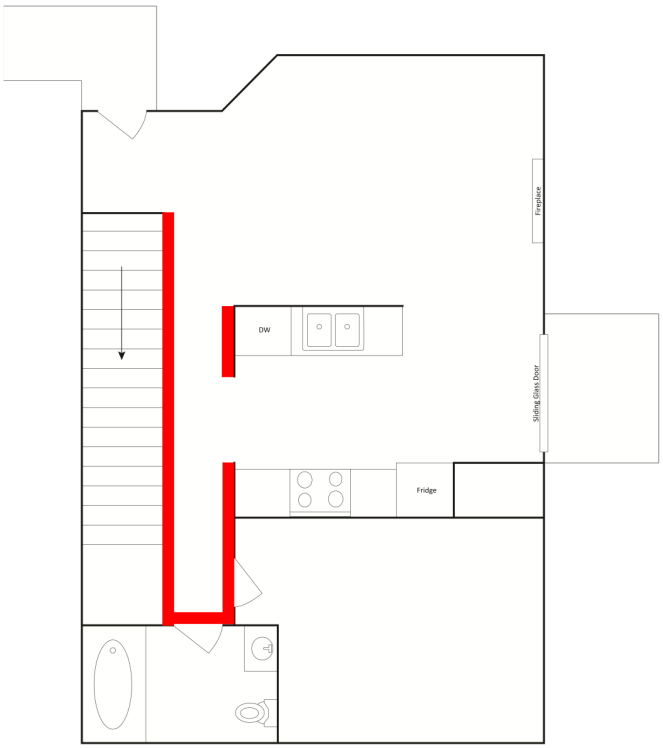
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	3:02:33 PM
Time Ended	3:15:54 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

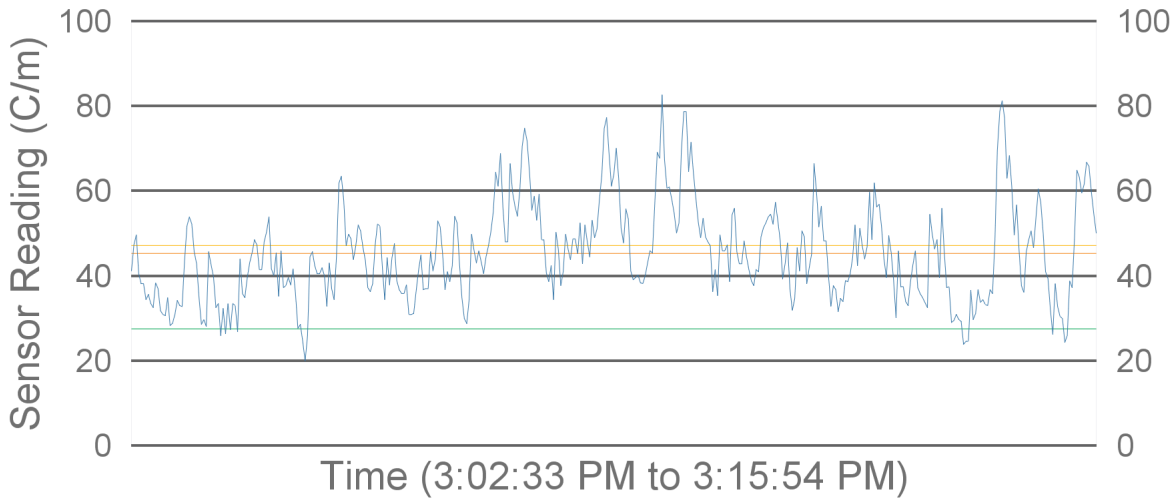


No. of Readings: 410

Max. Value	82.73	**Ave. Bckgrnd**	27.56
Min. Value	19.92	**Action Level**	47.19
Std. Deviation	11.53	**Ave. of Results**	45.32

Matrix:	Wall
Room:	First Floor Hallway

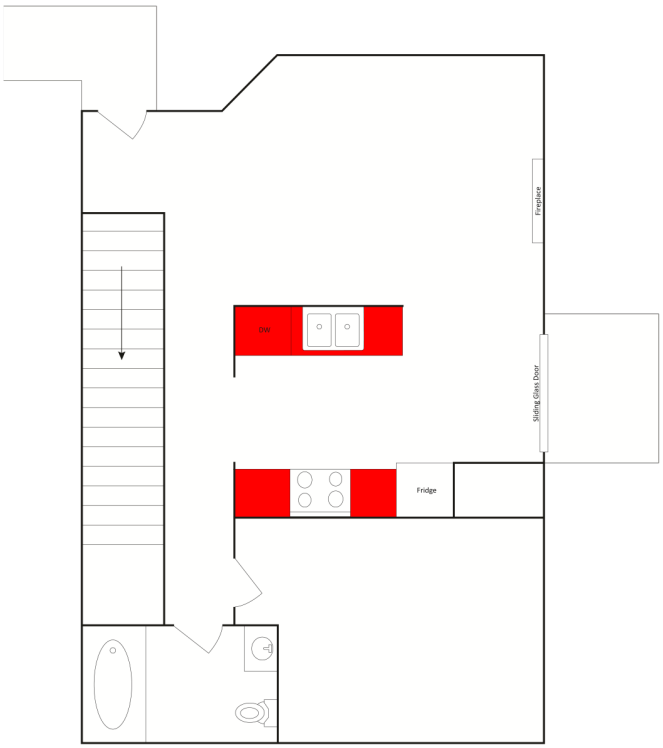
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	3:08:47 PM
Time Ended	3:10:16 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

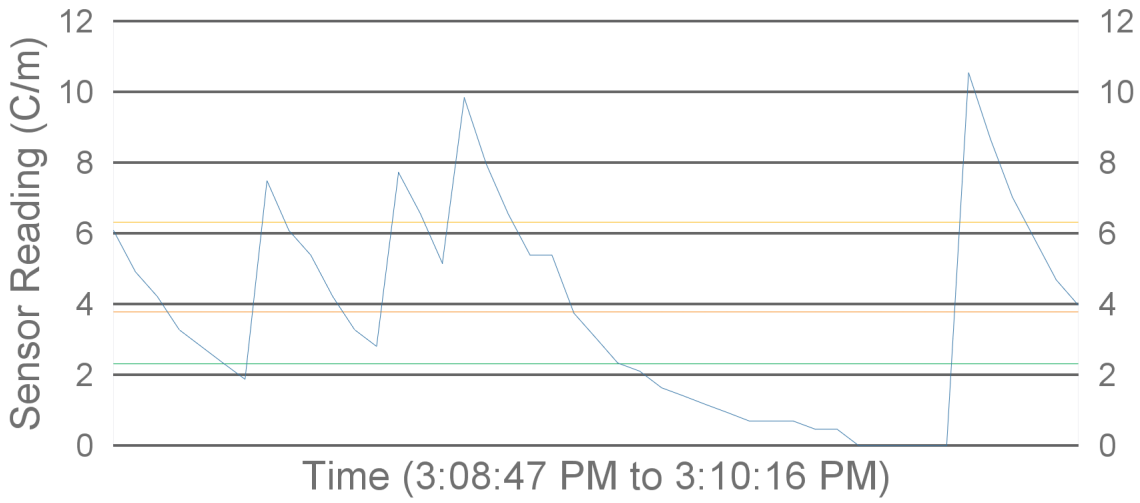


No. of Readings: 46

Max. Value	10.55	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	2.86	**Ave. of Results**	3.79

Matrix:	Formica
Room:	Kitchen (KN)

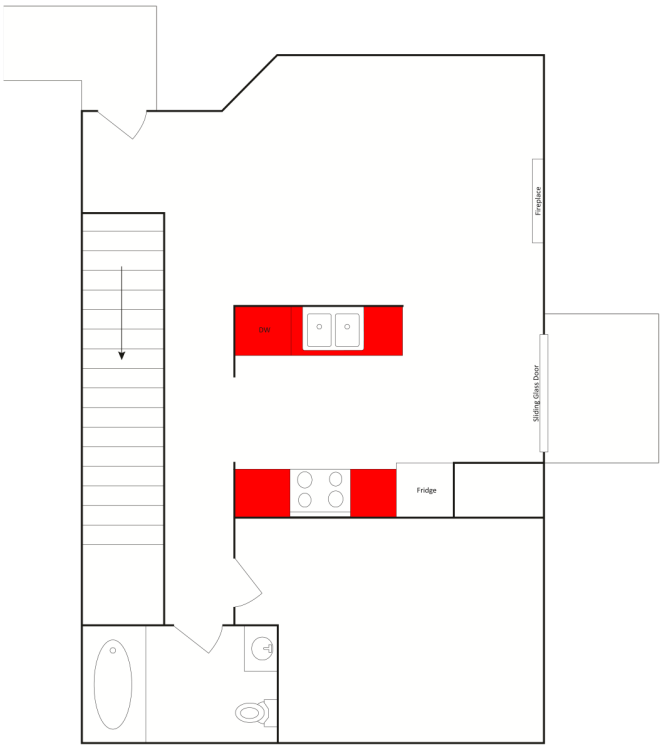
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	3:16:27 PM
Time Ended	3:20:25 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

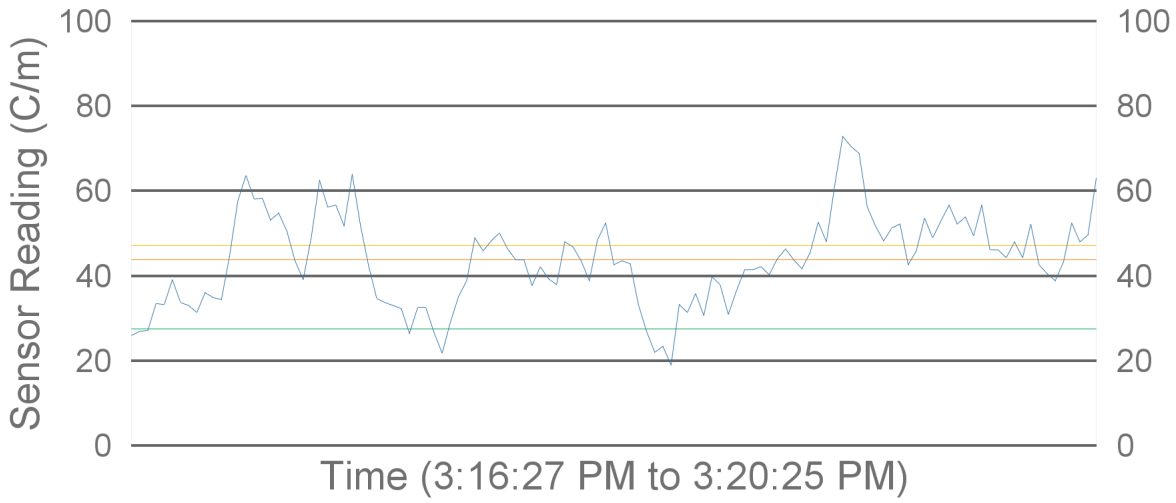


No. of Readings: 122

Max. Value	72.89	**Ave. Bckgrnd**	27.56
Min. Value	18.98	**Action Level**	47.19
Std. Deviation	10.66	**Ave. of Results**	43.85

Matrix:	Formica
Room:	Kitchen (KN)

Survey Results

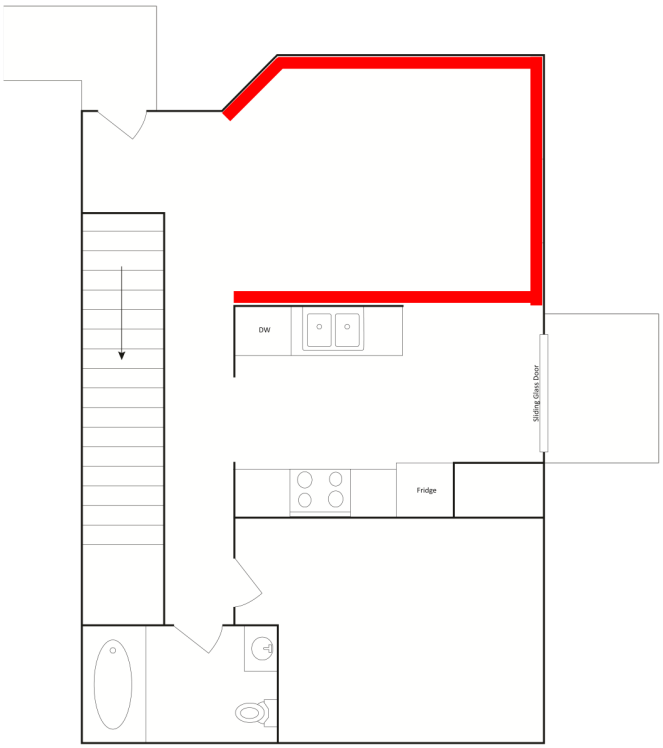


Ratemeter Model 44-9 Pancake G-M Detector (Position 4)
Action Level (47.18 C/m)
Background (27.55 C/m)
Average Readingl (43.84 C/m)

Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	3:16:44 PM
Time Ended	3:27:40 PM
Surveyor	Moersen
Recorder	Nuchims
Instrument	Ludlum 2241-2
Serial Number	189744
Probe Type	Alpha
LINC Number	LINC .218
Reference Matrix	Wall (alpha)

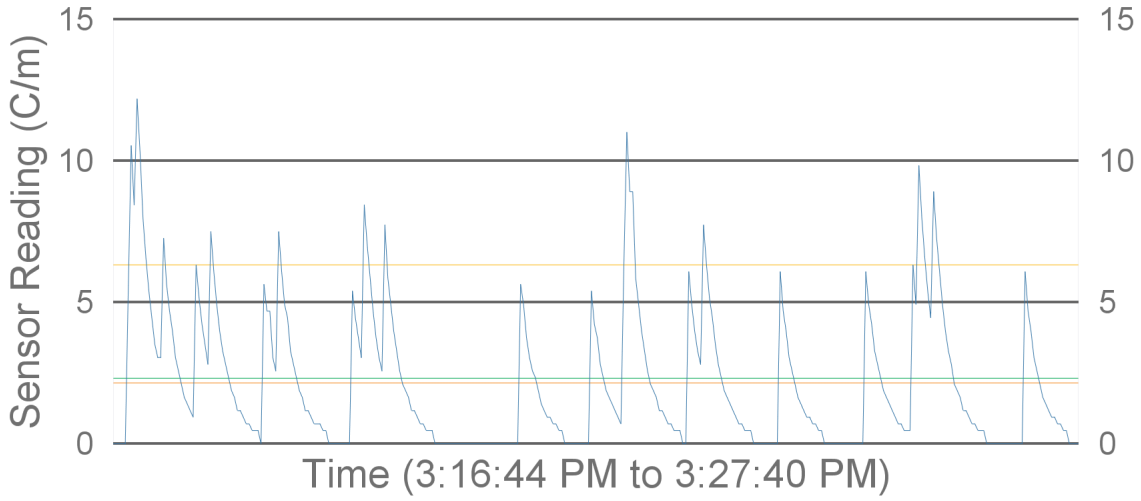


No. of Readings: 336

Max. Value	12.19	**Ave. Bckgrnd**	2.32
Min. Value	0.00	**Action Level**	6.32
Std. Deviation	2.51	**Ave. of Results**	2.15

Matrix:	Wall
Room:	Living Room (LV)

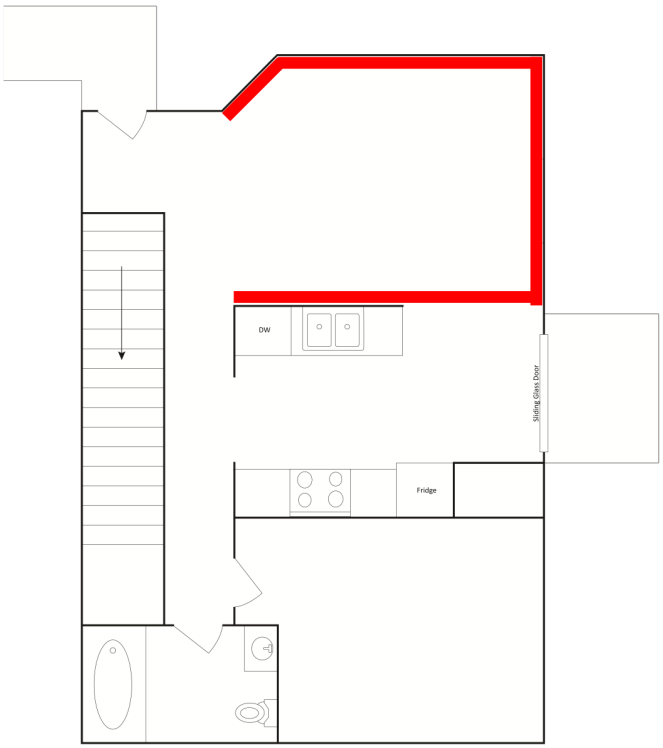
Survey Results



Viper Field Survey Report

Treasure Valley Apt Screening

Date Started	1/21/2015
Time Started	3:21:15 PM
Time Ended	03:36:40 PM
Surveyor	Worden
Recorder	Nuchims
Instrument	Ludlum 2241-3
Serial Number	295766
Probe Type	Beta/Gamma
LINC Number	LINC .201
Reference Matrix	Wall (beta/gamma)

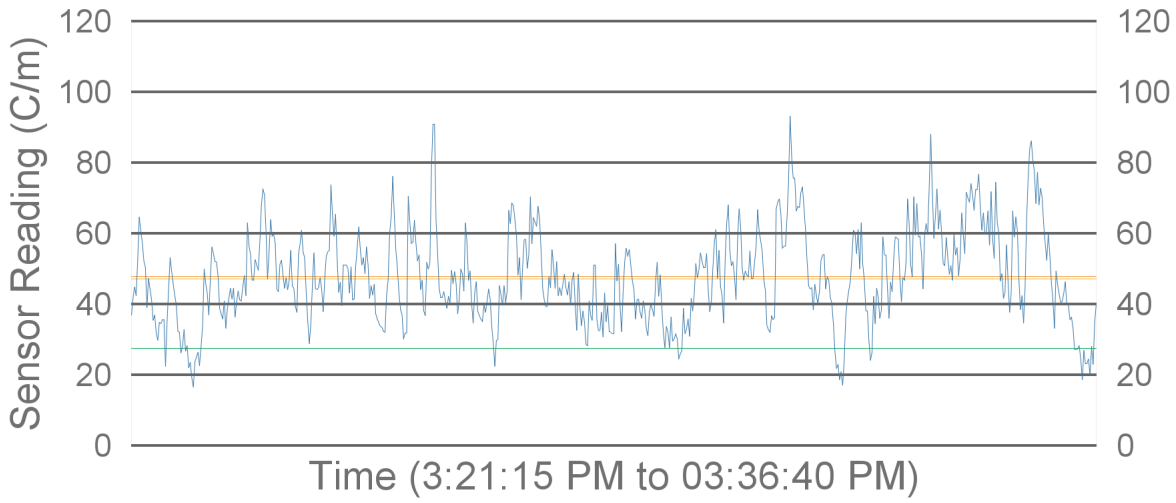


No. of Readings: 641

Max. Value	93.28	**Ave. Bckgrnd**	27.56
Min. Value	16.64	**Action Level**	47.19
Std. Deviation	13.37	**Ave. of Results**	47.90

Matrix:	Wall
Room:	Living Room (LV)

Survey Results



Ratemeter Model 44-9 Pancake G-M Detector (Position 4)
Action Level (47.18 C/m)
Background (27.55 C/m)
Average Readingl (47.9 C/m)